**OECD Programme for**
**International Student Assessment 2015**

# PISA 2015 RELEASED FIELD TRIAL COGNITIVE ITEMS

**Doc:** CY6_TST_PISA2015FT_Released_Cognitive_Items

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## Contents

## Scientific Literacy – Overview

Thirty-five new Science items from the 2015 Field Trial were approved by the Scientific Literacy Expert Group for release as sample items. The items are presented in this document in two groups:

- **Standard units,** which consist of static materials including text, graphics, tables, and graphs and associated questions.
- **Interactive units,** which include interactive stimulus materials and associated questions.

The question intent is provided for each released item, showing how the item was classified according to the construct categories in the 2015 Scientific Literacy draft framework. These categories include: **competencies**, **types of scientific knowledge**, **contexts**, and **cognitive demand**. Each was explained more fully in the draft framework, as shown below.

## COMPETENCIES

The boxes below provide an elaborated description of the kinds of performance expected for a display of the three competencies required for scientific literacy. The descriptions, framed as actions, are intended to convey the idea that the scientifically literate person both understands and is capable of undertaking a basic set of practices which are essential for scientific literacy.

| **1. Explain Phenomena Scientifically** |
|---|
| Recognise, offer and evaluate explanations for a range of natural and technological phenomena demonstrating the ability to:<br>▪ Recall and apply appropriate scientific knowledge;<br>▪ Identify, use, and generate explanatory models and representations;<br>▪ Make and justify appropriate predictions;<br>▪ Offer explanatory hypotheses;<br>▪ Explain the potential implications of scientific knowledge for society. |

| 2. Evaluate and design scientific enquiry |
|---|
| Describe and appraise scientific enquiries and propose ways of addressing questions scientifically demonstrating the ability to:<br>▪ Identify the question explored in a given scientific study;<br>▪ Distinguish questions that are possible to investigate scientifically;<br>▪ Propose a way of exploring a given question scientifically;<br>▪ Evaluate ways of exploring a given question scientifically;<br>▪ Describe and evaluate a range of ways that scientists use to ensure the reliability of data and the objectivity and generalisability of explanations. |

| 3. Interpret data and evidence scientifically |
|---|
| Analyse and evaluate scientific information, claims and arguments in a variety of representations and draw appropriate conclusions by demonstrating the ability to:<br>▪ Transform data from one representation to another;<br>▪ Analyse and interpret data and draw appropriate conclusions;<br>▪ Identify the assumptions, evidence and reasoning in science-related texts;<br>▪ Distinguish between arguments which are based on scientific evidence and theory and those based on other considerations;<br>▪ Evaluate scientific arguments and evidence from different sources (e.g., newspaper, Internet, journals). |

## TYPES OF SCIENTIFIC KNOWLEDGE

The ability of students to demonstrate these competencies is dependent on three types of scientific knowledge. These are defined as:

- **Content knowledge**, knowledge of the content of science (including physical systems, living systems, and earth and space science),
- **Procedural knowledge**, knowledge of the diversity of methods and practices that are used to establish scientific knowledge as well as its standard procedures, and
- **Epistemic knowledge**, knowledge of how our beliefs in science are justified as a result of understanding the functions of scientific practices, their justifications, and the meaning of terms such as theory, hypothesis, and observation

## CONTEXTS

The PISA 2015 assessment requires evidence of these competencies and knowledge in a range of contexts including:

- health,
- natural resources,
- the environment,
- hazards, and
- the frontiers of science and technology

in

- personal,
- local/national, and
- global settings.

## COGNITIVE DEMAND

A key new feature of the 2015 PISA framework is the definition of levels of cognitive demand within the assessment of scientific literacy and across all three competences of the framework. The difficulty of any item is a combination both of the degree of complexity and range of knowledge it requires and the cognitive operations that are required to process the item. The levels defined for this assessment include:

- **Low**
  Carry out a one-step procedure, for example recall of a fact, term, principle or concept or locate a single point of information from a graph or table.

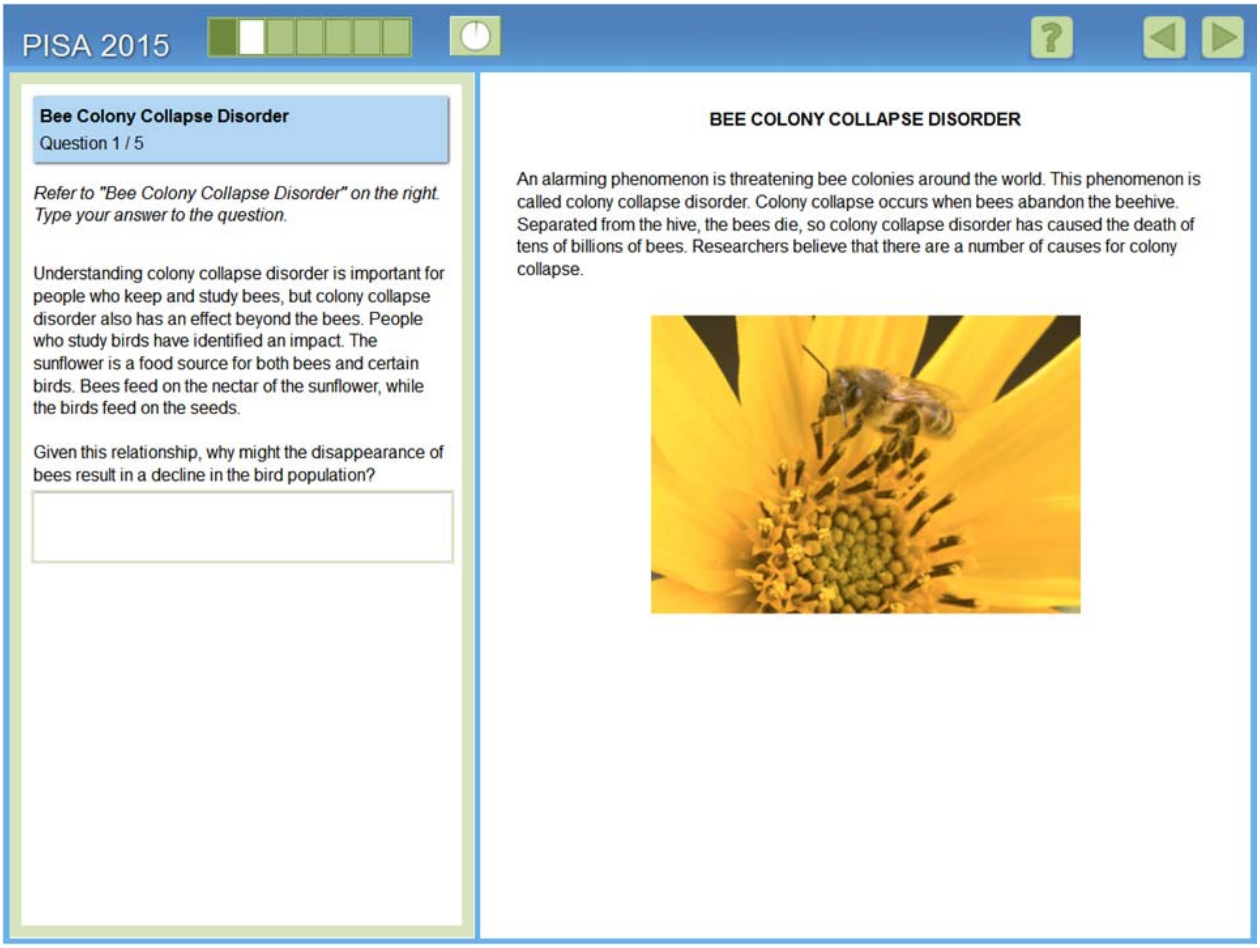
- **Medium**
  Use and apply conceptual knowledge to describe or explain phenomena, select appropriate procedures involving two or more steps, organise/display data, interpret or use simple data sets or graphs.

- **High**
  Analyse complex information or data, synthesise or evaluate evidence, justify, reason given various sources, develop a plan or sequence of steps to approach a problem.

## Unit CS600 *Bee Colony Collapse Disorder*
## Unit Overview

This released unit deals with the phenomenon known as bee colony collapse disorder. The stimulus materials include a short text introducing the phenomenon and a graph showing results of a study investigating the relationship between the insecticide imidacloprid and bee colony collapse disorder.

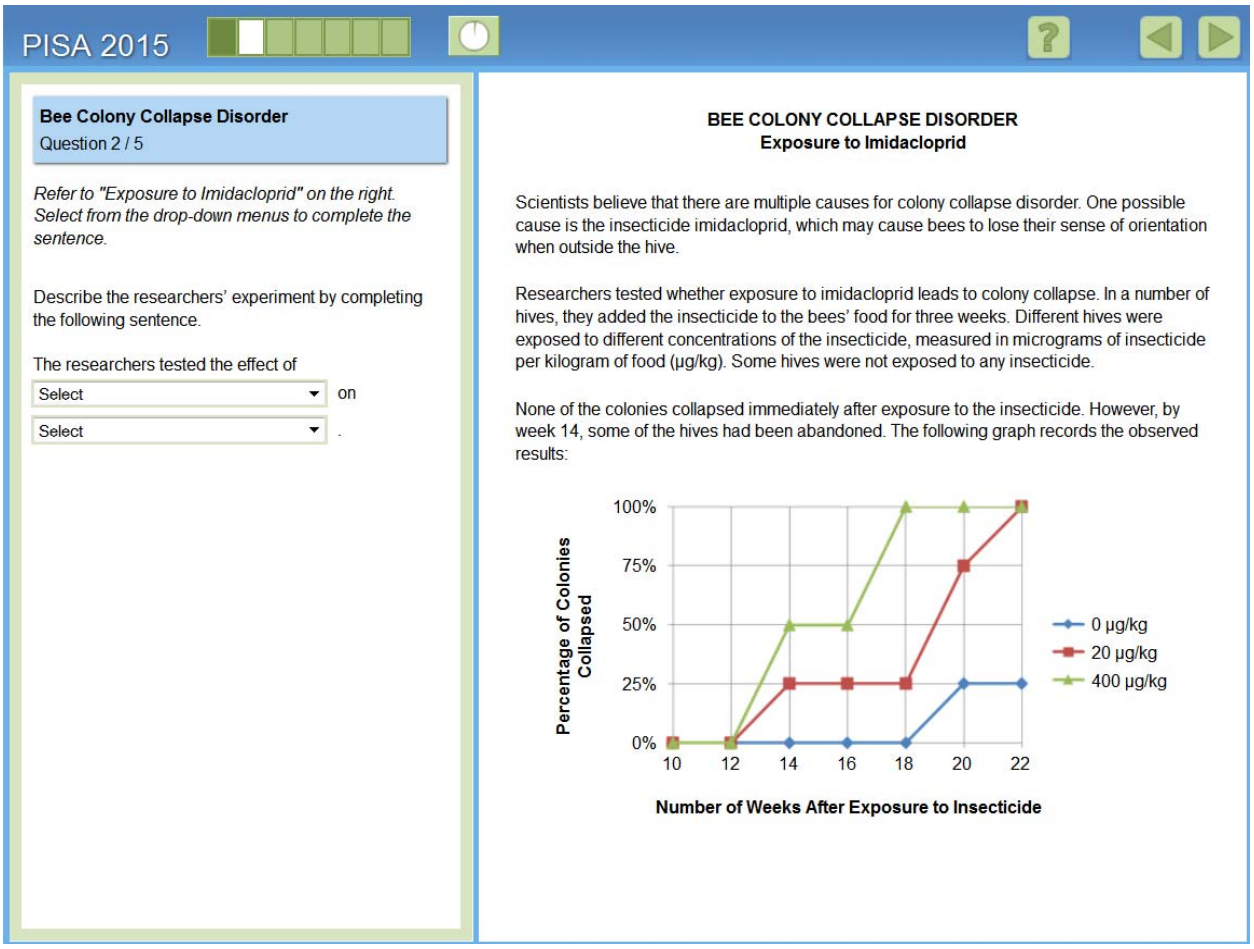
## Unit CS600 *Bee Colony Collapse Disorder*
## Released Item #1




To correctly answer this question, students must provide an explanation that states or implies that a flower cannot produce seeds without pollination. The competency for this item is 'Explain Phenomena Scientifically,' as students are asked to recall appropriate scientific knowledge.

| | |
|---|---|
| *Item Number* | CS600Q01 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Living |
| *Context* | Local/National – Environmental Quality |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

**Unit CS600 *Bee Colony Collapse Disorder***
**Released Item #2**



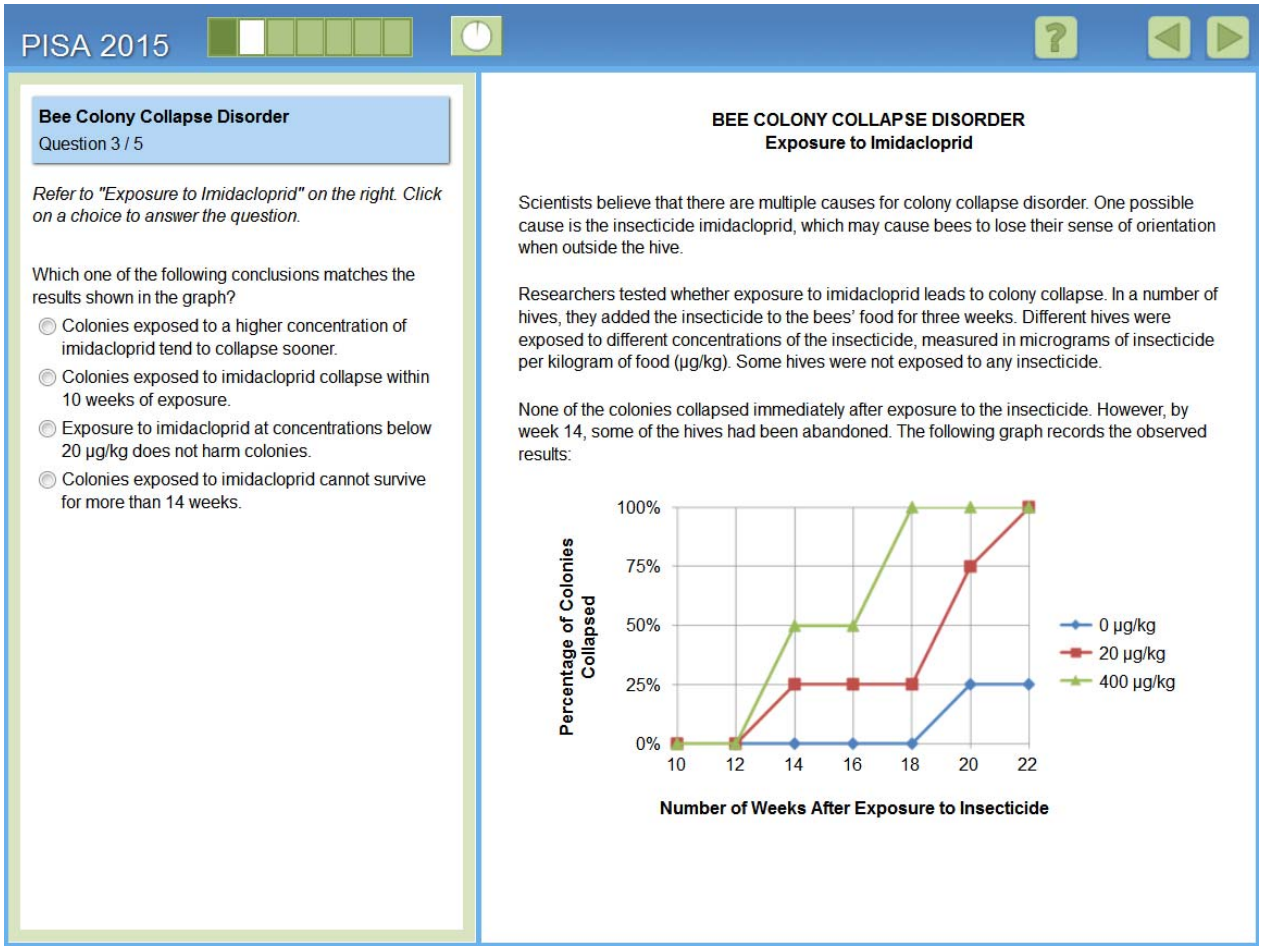

Students are asked to select from among three options in each drop-down menu to demonstrate their understanding of the question being explored in the researchers' experiment. Those options include:

- collapse of bee colonies
- concentration of imidacloprid in food
- bee immunity to imidacloprid

The response that the researchers tested the effect of *concentration of imidacloprid in food* on *collapse of bee colonies* correctly identifies the independent and dependent variables in the experiment.

| | |
|---|---|
| *Item Number* | CS600Q02 |
| *Competency* | Evaluate and Design Scientific Enquiry |
| *Knowledge – System* | Procedural |
| *Context* | Local/National – Environmental Quality |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

**Unit CS600 *Bee Colony Collapse Disorder***
**Released Item #3**

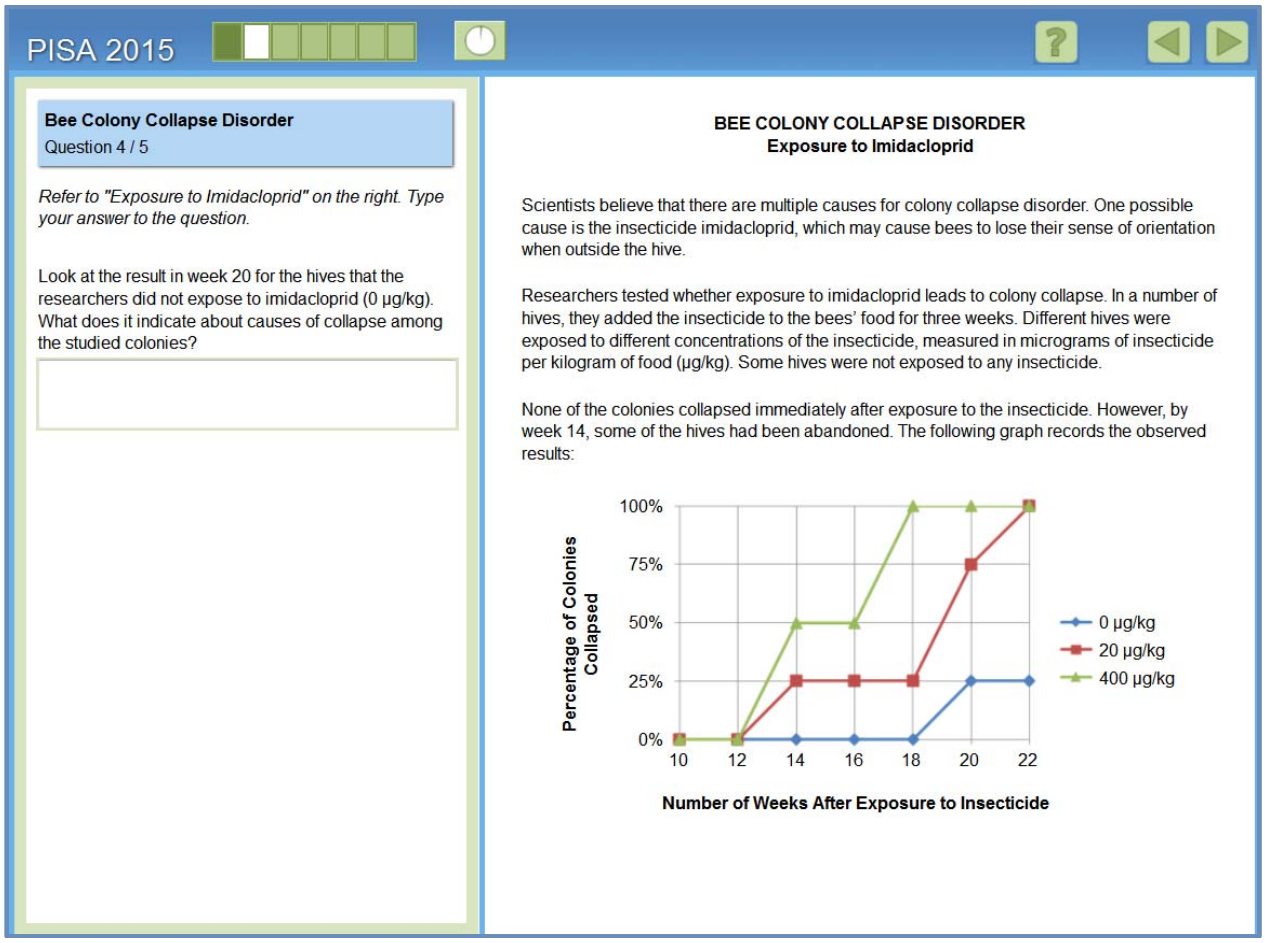



This question requires interpretation of a graph that presents data related to the relationship between concentrations of the insecticide and the rate of colony collapse over time.

The correct response is the first option (*Colonies exposed to a higher concentration of imidacloprid tend to collapse sooner*) as the graph shows that the percentage of colonies that collapsed is higher when the hives were exposed to a concentration of 400 µg/kg of the insecticide as compared with 20 µg/kg during weeks 14-20 of the experiment.

| | |
|---|---|
| *Item Number* | CS600Q03 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Local/National – Environmental Quality |
| *Cognitive Demand* | Medium |
| *Item Format* | Simple Multiple Choice – Computer Scored |

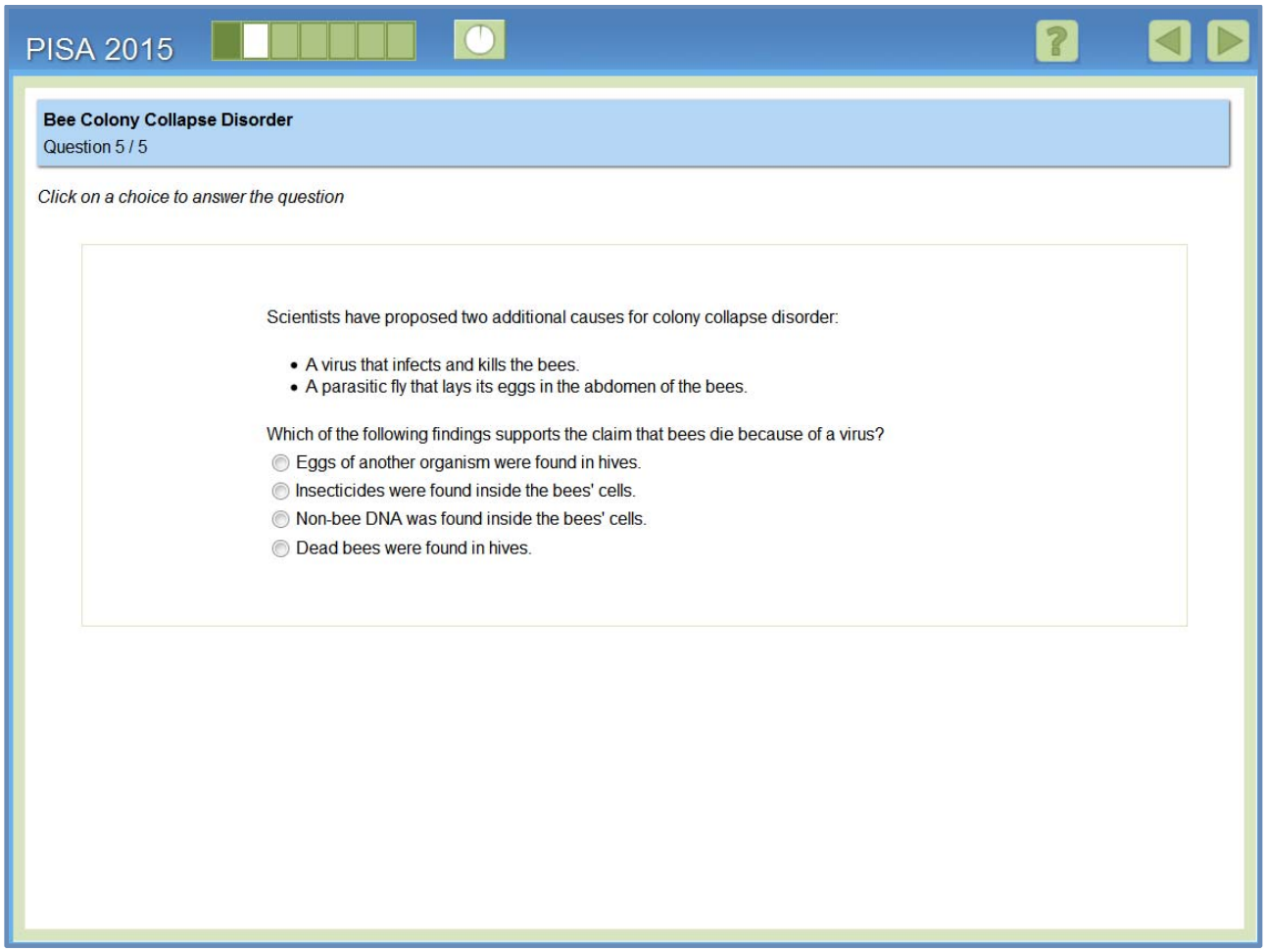
**Unit CS600 *Bee Colony Collapse Disorder***
**Released Item #4**




Students must provide a hypothesis for the collapses among the control colonies. A correct response indicates either that there must be another natural cause of colony collapse for the studied colonies or that the hives in the control group were not properly protected from exposure.

| | |
|---|---|
| *Item Number* | CS600Q04 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Living |
| *Context* | Local/National – Environmental Quality |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

**Unit CS600 *Bee Colony Collapse Disorder***
**Released Item #5**



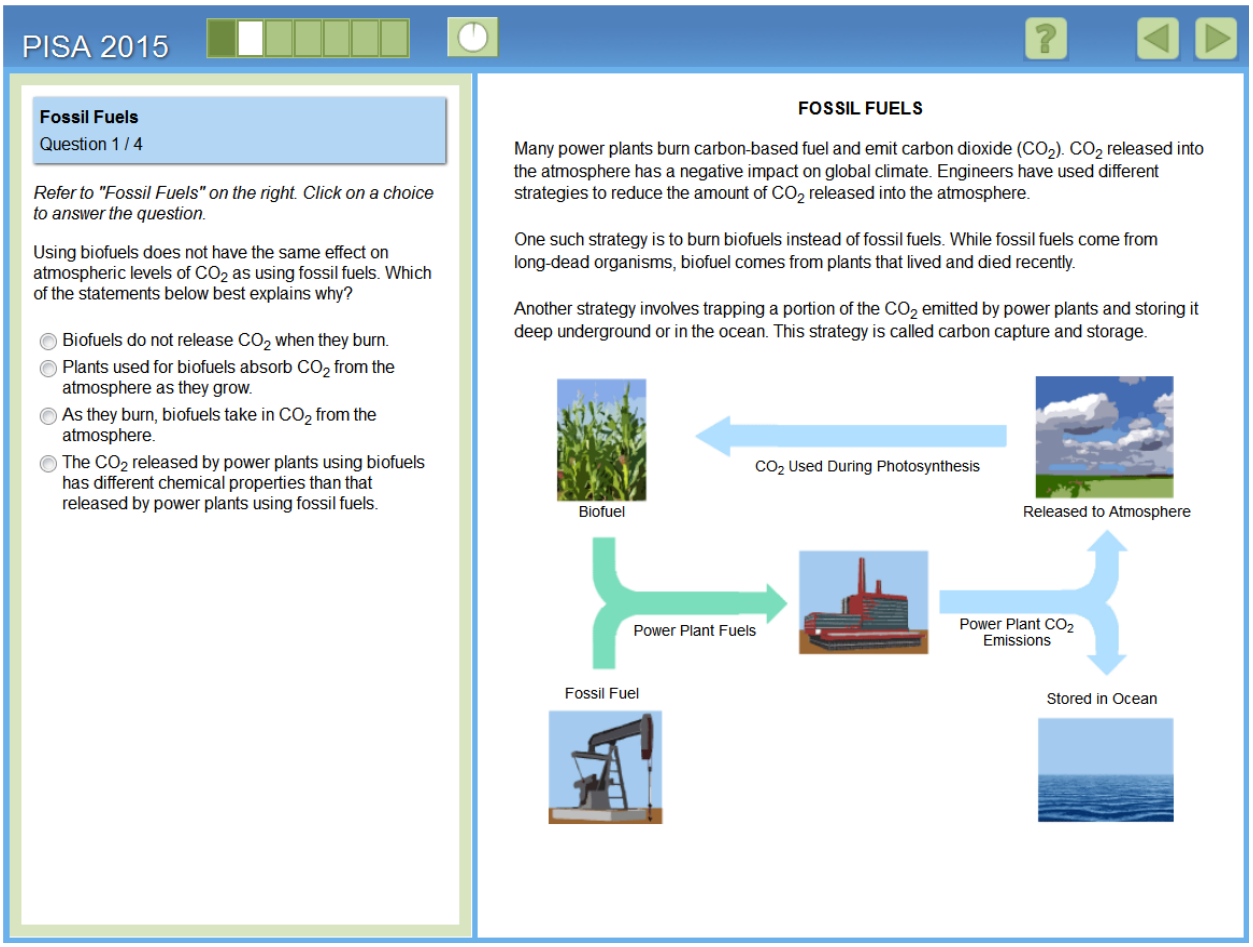

Students must use appropriate scientific content knowledge about the viral infections to explain the phenomenon described in this item. The correct response is the third option: *Non-bee DNA was found inside the bees' cells.*

| | |
|---|---|
| *Item Number* | CS600Q05 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Living |
| *Context* | Local/National – Environmental Quality |
| *Cognitive Demand* | Medium |
| *Item Format* | Simple Multiple Choice – Computer Scored |

## Unit CS613 *Fossil Fuels*
## Unit Overview

This released unit explores the relationship between the burning of fossil fuels and $CO_2$ levels in the atmosphere. The stimulus material includes a diagram illustrating how carbon cycles in the environment and a short text describing strategies for reducing the amount of $CO_2$ released into the atmosphere, a table comparing the characteristics of ethanol and petroleum when used as fuel, and a graph illustrating the results of a mathematical model that calculates carbon capture and storage at three different ocean depths.

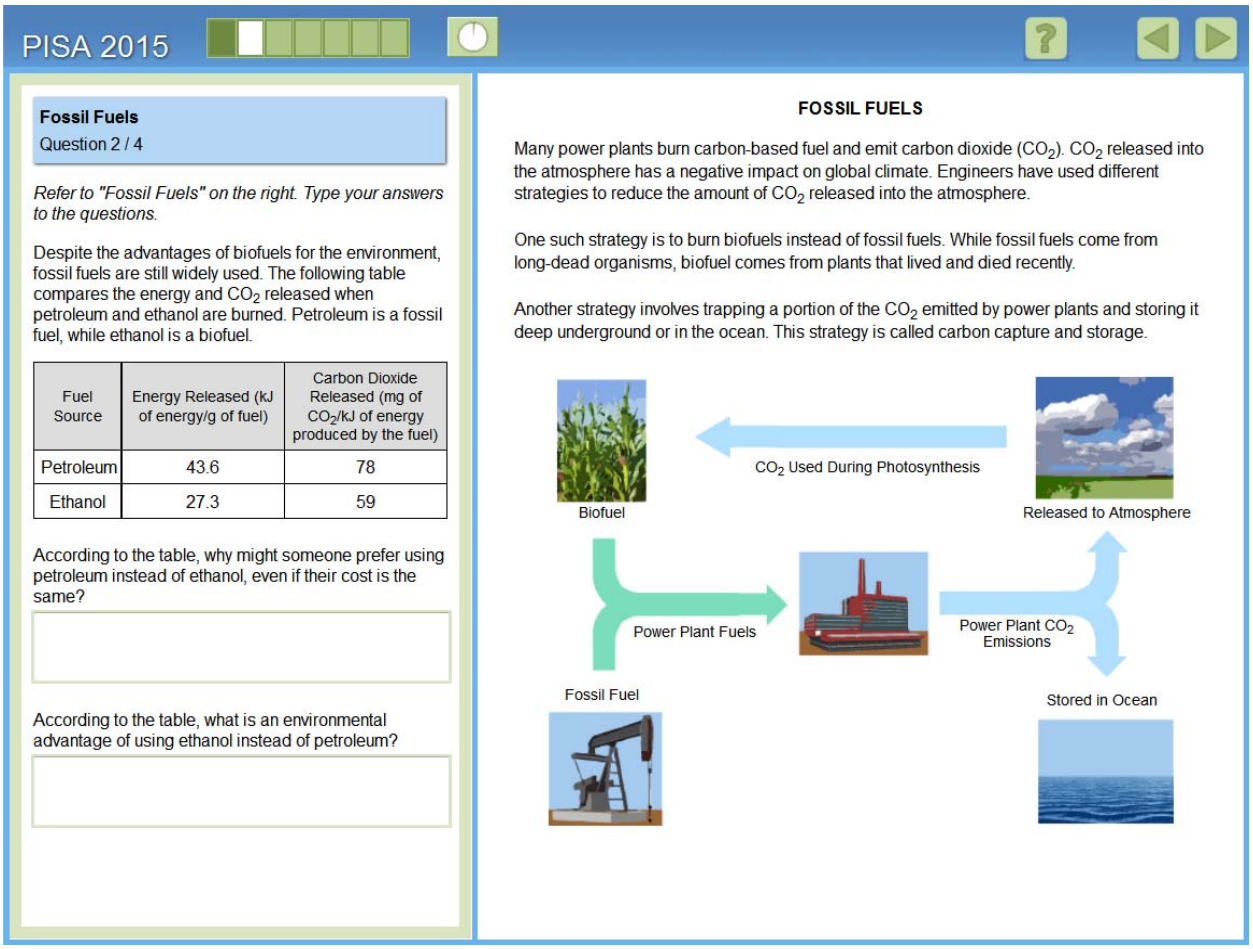
## Unit CS613 *Fossil Fuels*
## Released Item #1




Students must use appropriate scientific content knowledge to explain why the use of plant-based biofuels does not affect atmospheric levels of $CO_2$ in the same manner as burning fossil fuels. The second option is the correct response: *Plants used for biofuels absorb $CO_2$ from the atmosphere as they grow.*

| | |
|---|---|
| *Item Number* | CS613Q01 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Physical |
| *Context* | Global – Natural Resources |
| *Cognitive Demand* | Medium |
| *Item Format* | Simple Multiple Choice – Computer Scored |

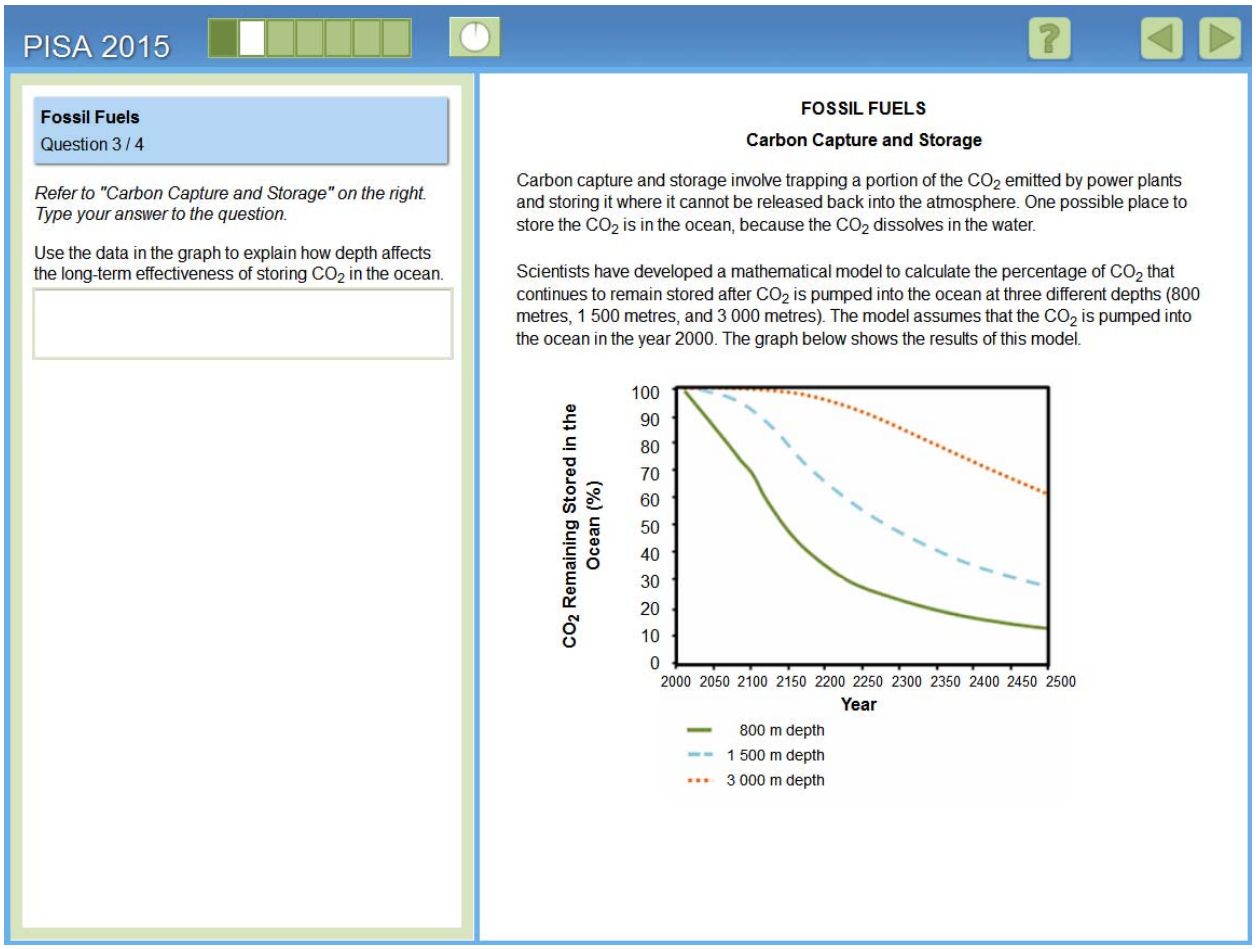
**Unit CS613 *Fossil Fuels***
**Released Item #2**




The item asks students to analyse data presented in a table to compare ethanol and petroleum as fuel sources. Students should determine that people might prefer using petroleum over ethanol because it releases more energy for the same cost and that ethanol has an environmental advantage over petroleum because it releases less carbon dioxide.

| | |
|---|---|
| *Item Number* | CS613Q02 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Local/National – Natural Resources |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

## Unit CS613 *Fossil Fuels*
## Released Item #3[1]




Students must interpret data presented in a graph to provide an explanation that summarises the overall finding that storing carbon dioxide deeper in the ocean leads to better retention rates over time than storing it at shallower depths.

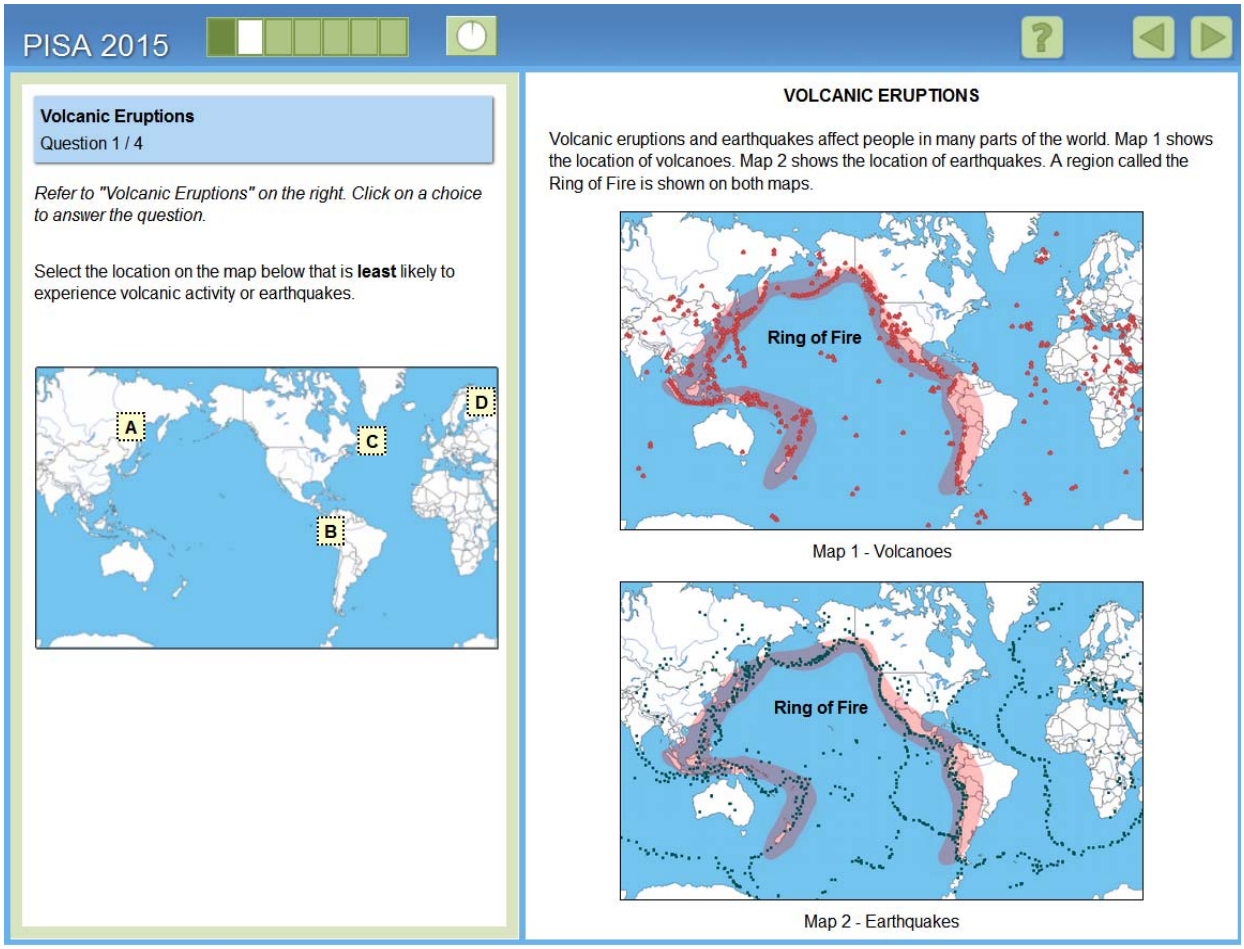
| | |
|---|---|
| *Item Number* | CS613Q03 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Global – Natural Resources |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

[1] Note that the fourth item in this unit, CS613Q04, is not included among the released items.

## Unit CS644 *Volcanic Eruptions*
## Unit Overview

This released unit focuses on the distribution pattern of volcanoes and the impact of volcanic eruptions on climate and the atmosphere. Stimulus materials include a map showing the location of volcanoes and earthquakes around the globe and graphs illustrating the impact that volcanic eruptions have on the amount of solar radiation that reaches Earth's surface and on carbon dioxide concentrations in the atmosphere.

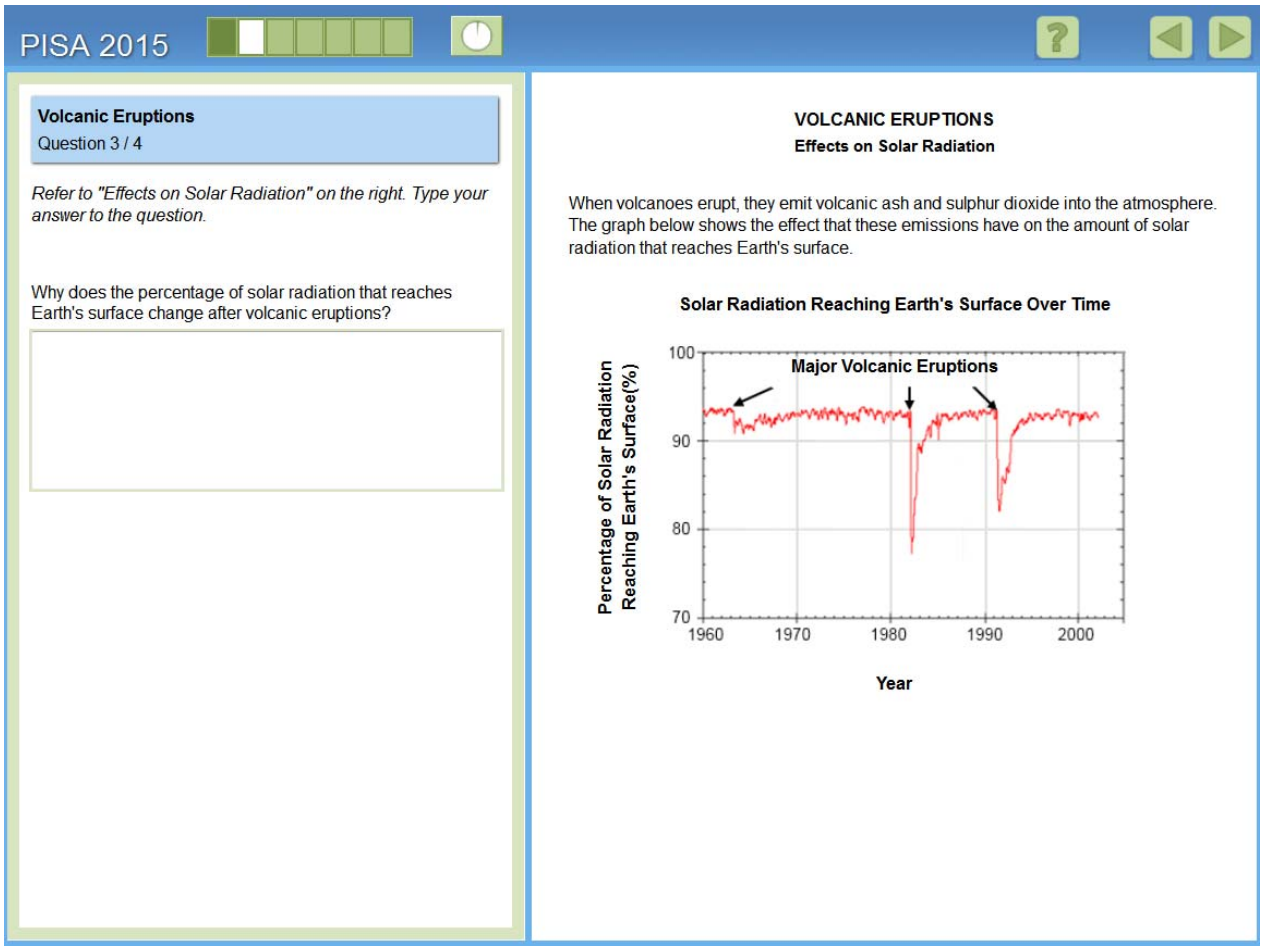
## Unit 644 *Volcanic Eruptions*
## Released Item #1




Students must interpret data presented on a map to identify the location least likely to experience volcanic activity or earthquakes. The correct response is map location *D*, over northern Europe.

| | |
|---|---|
| *Item Number* | CS644Q01 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Global – Hazards |
| *Cognitive Demand* | Low |
| *Item Format* | Simple Multiple Choice – Computer Scored |

## Unit 644 *Volcanic Eruptions*
## Released Item #2[2]

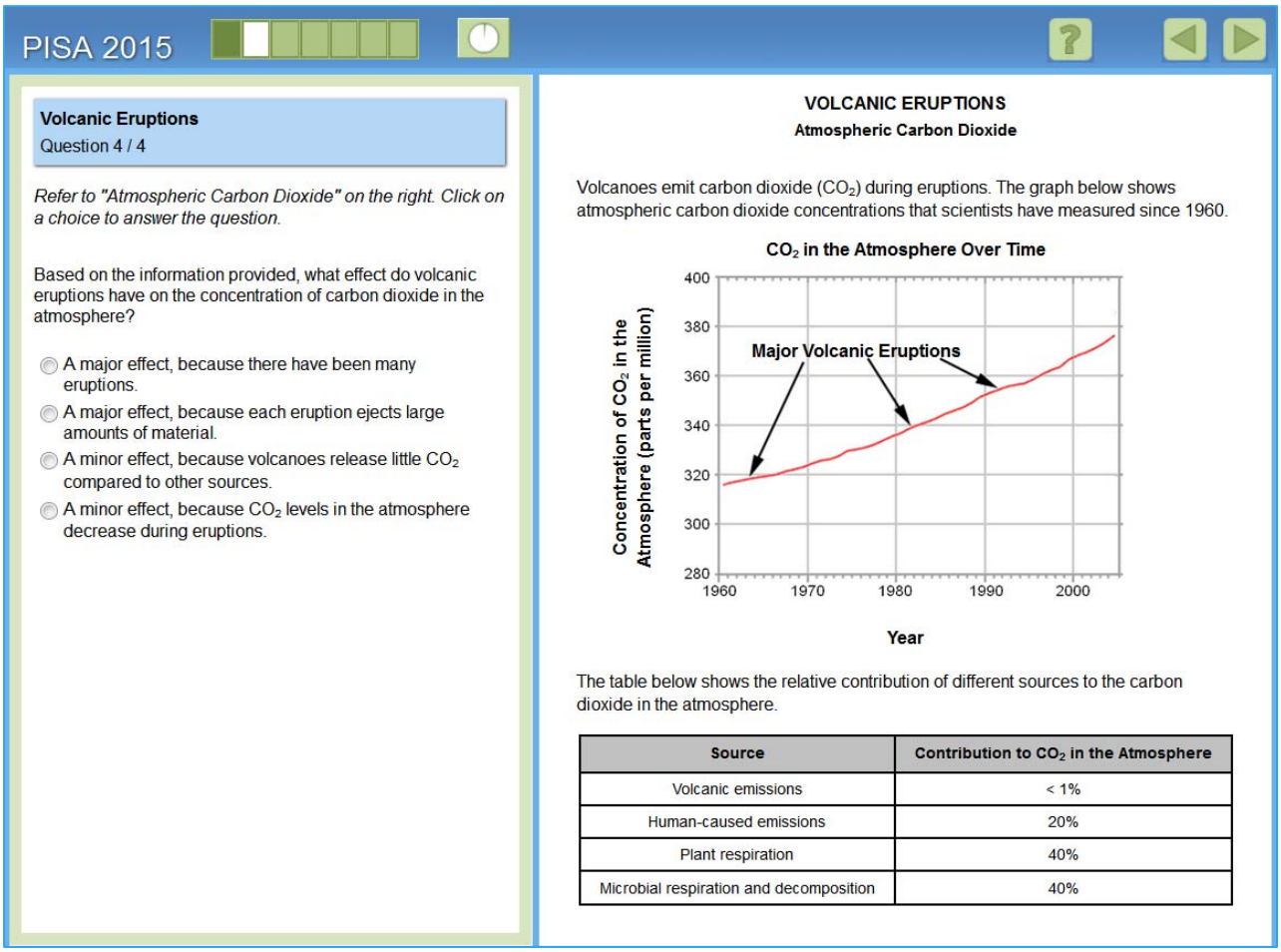



Students must correctly interpret the graphed data as showing that the percentage of solar radiation reaching Earth's surface is reduced during major volcanic eruptions, and provide an explanation indicating or implying that volcanic emissions reflect or absorb solar radiation.

| | |
|---|---|
| *Item Number* | CS644Q03 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Content – Earth and Space |
| *Context* | Global – Hazards |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

[2] Note that the second item in this unit, CS644Q02, is not included among the released items.

## Unit 644 *Volcanic Eruptions*
## Released Item #3



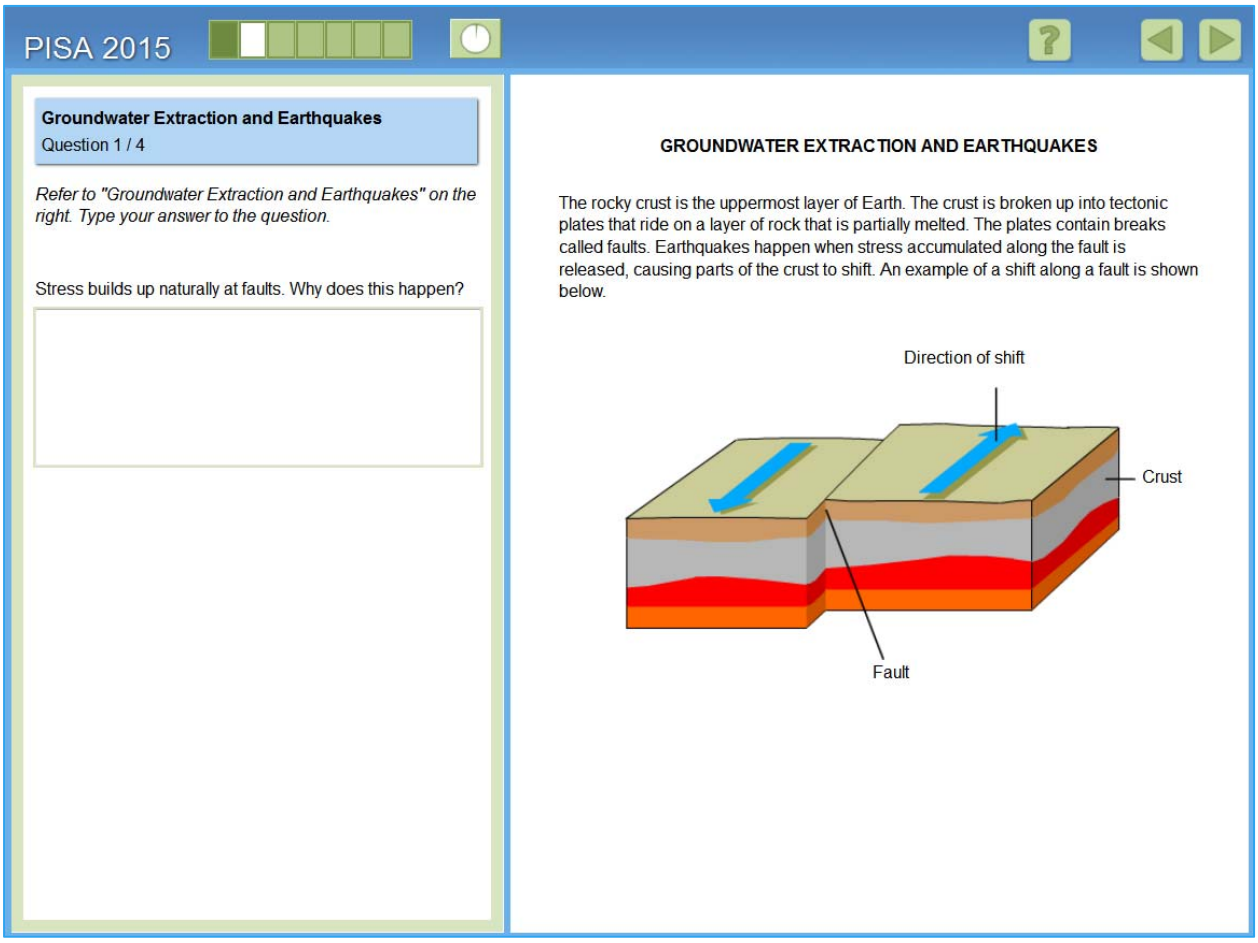

Students must interpret the provided data as supporting the third response which says that volcanoes have a minor effect on the concentration of carbon dioxide in the atmosphere because they release little $CO_2$ compared to other sources.

| | |
|---|---|
| *Item Number* | CS644Q04 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Global – Hazards |
| *Cognitive Demand* | Low |
| *Item Format* | Simple Multiple Choice – Computer Scored |

## Unit 655 *Groundwater Extraction and Earthquakes*
## Unit Overview

This unit focuses on natural and human processes that may lead to earthquakes. The stimulus materials include a text and graphic illustrating the relationship of faults to earthquakes, a map showing levels of stress in one region of Earth, and a short text about an earthquake believed to have been caused by groundwater extraction.

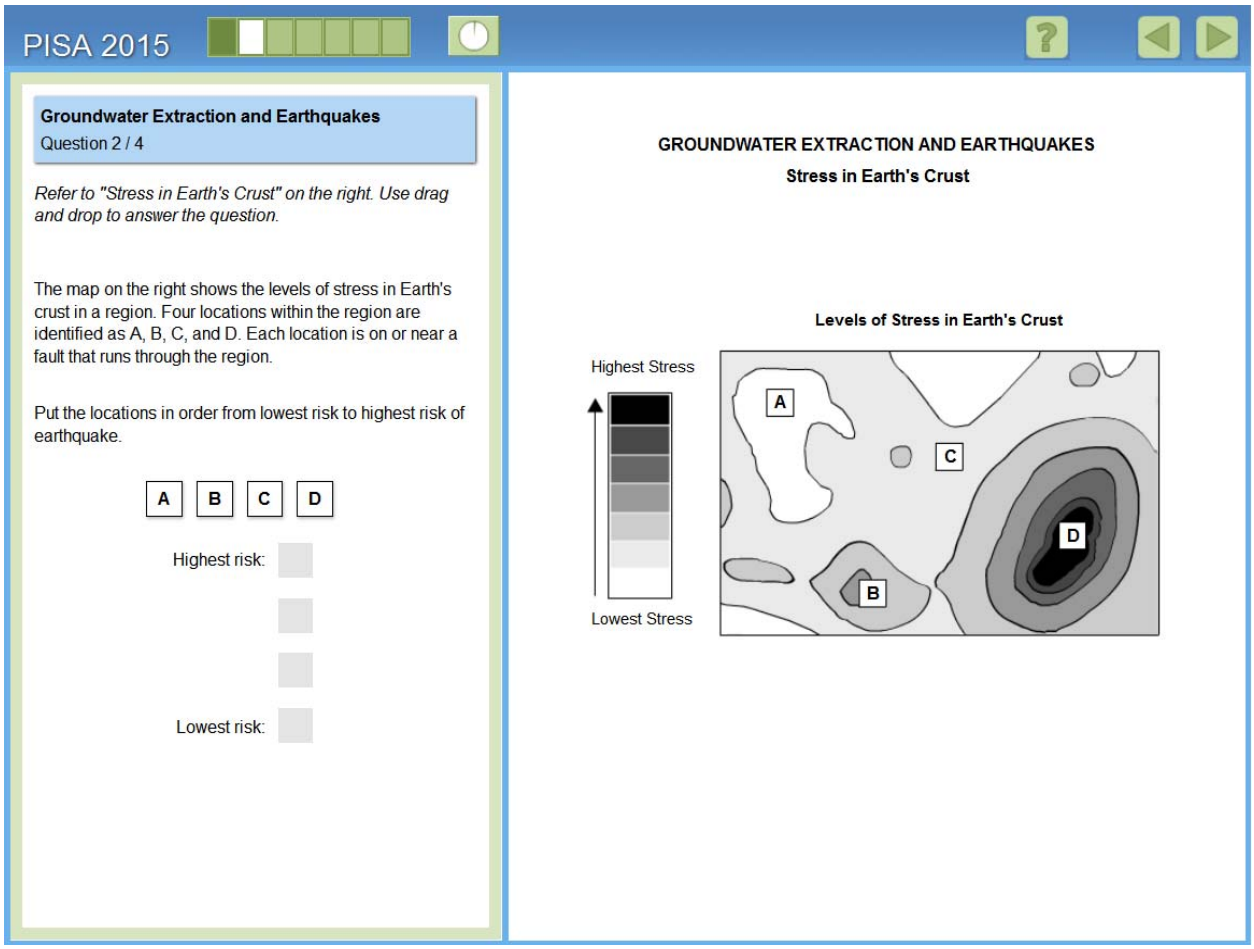
## Unit 655 *Groundwater Extraction and Earthquakes*
## Released Item #1




Using the description and representation of faults provided in the stimulus, students must provide an explanation that indicates or implies that the movement of tectonic plates leads to the build-up of stress and/or that rock or land moving in different directions is stopped by friction at a fault.

| | |
|---|---|
| *Item Number* | CS655Q01 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Earth and Space |
| *Context* | Local/National – Hazards |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

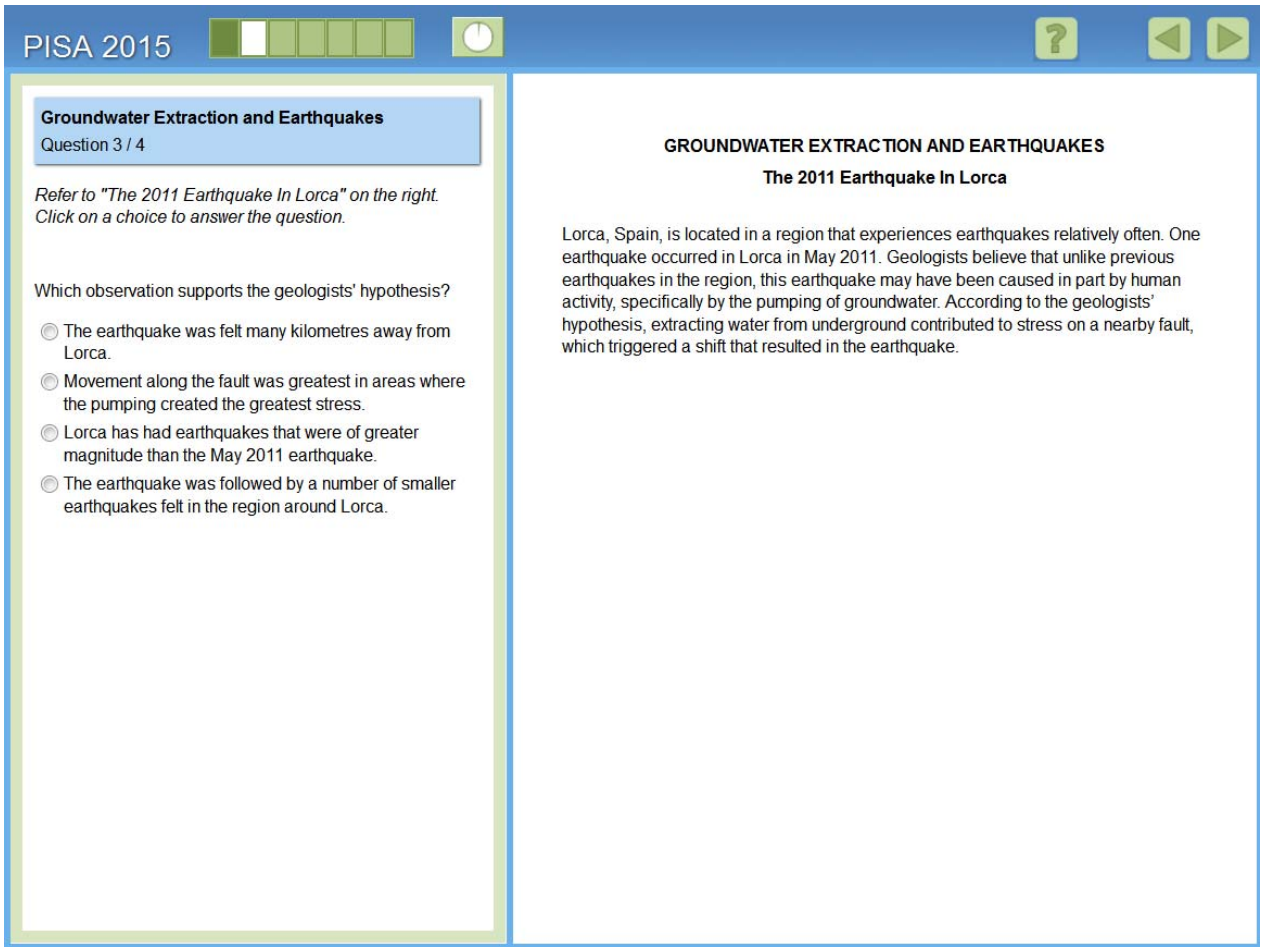
## Unit 655 *Groundwater Extraction and Earthquakes*
## Released Item #2




Students must apply their understanding of the relationship between stress in Earth's crust and earthquakes to predict the risk of earthquakes in four specific locations that are near faults. The location with the highest risk is the one labelled "D" on the diagram, followed by "B", "C" and finally "A", which has the lowest risk because it has the lowest level of stress.

| | |
|---|---|
| *Item Number* | CS655Q02 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Local/National – Hazards |
| *Cognitive Demand* | Low |
| *Item Format* | Complex Multiple Choice – Computer Scored |

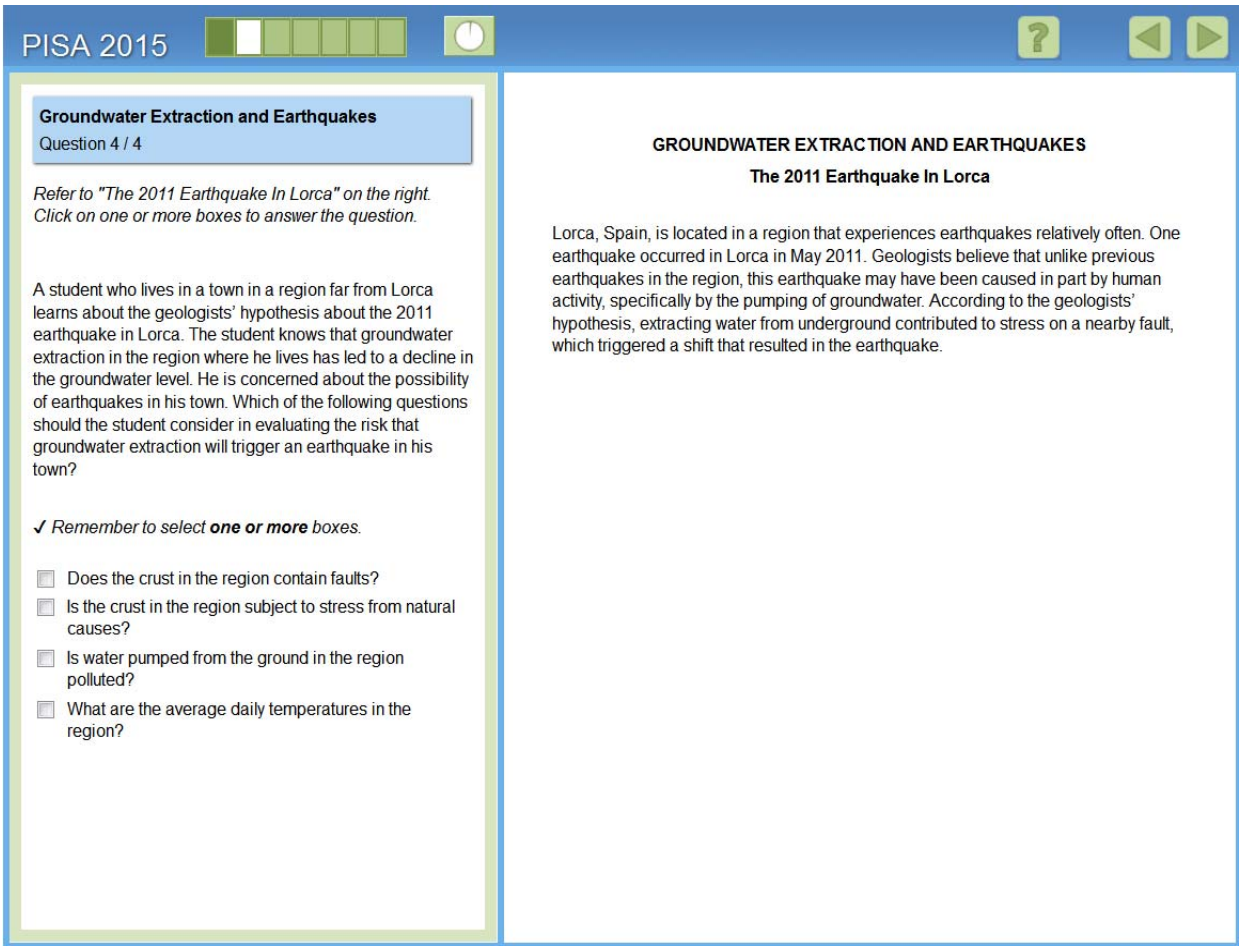
## Unit 655 *Groundwater Extraction and Earthquakes*
## Released Item #3




Students must identify the one observation that supports the hypothesis presented in the stimulus that groundwater extraction triggered an earthquake by contributing to stress on a nearby fault. The second option (*Movement along the fault was greatest in areas where the pumping created the greatest stress*) is the correct response as it supports an association between the water extraction and the earthquake.

| | |
|---|---|
| *Item Number* | CS655Q03 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Earth and Space |
| *Context* | Local/National – Hazards |
| *Cognitive Demand* | Medium |
| *Item Format* | Simple Multiple Choice – Computer Scored |

**Unit 655 *Groundwater Extraction and Earthquakes***
**Released Item #4**

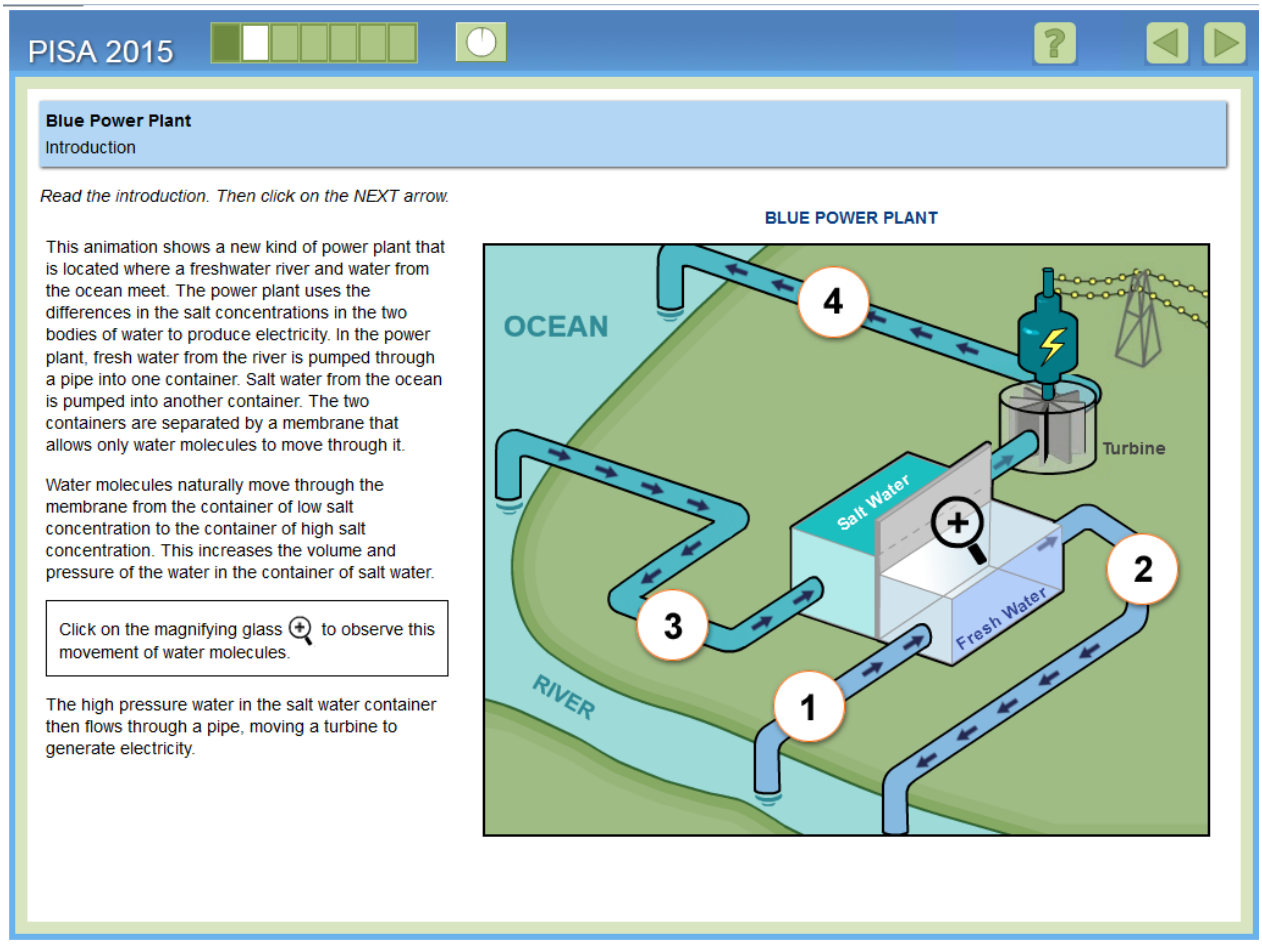



In this item, students must use their understanding of earthquakes and the provided information about the earthquake in Lorca to identify the question or questions most likely to provide information about the risk of earthquakes in a particular region. Both the first and second questions would provide that information: *Does the crust in the region contain faults?* and *Is the crust in the region subject to stress from natural causes?*

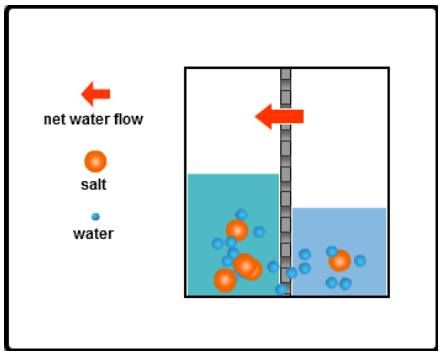
| | |
|---|---|
| *Item Number* | CS655Q04 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Earth and Space |
| *Context* | Local/National – Hazards |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

## Unit 639 *Blue Power Plant*
## Unit Overview

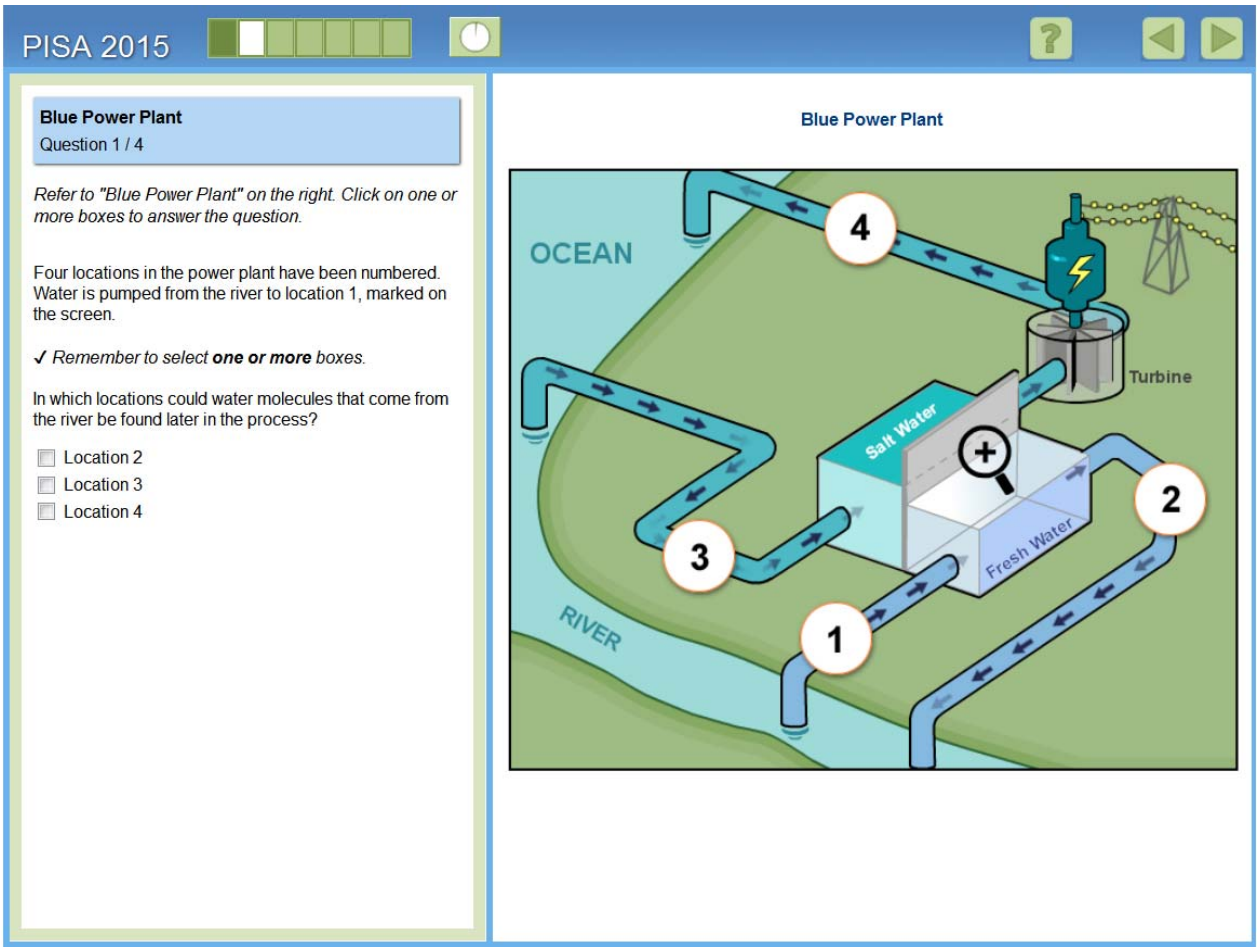
This released unit focuses on a power plant that uses the differences in the salt concentration between salt water and fresh water to generate electricity. The stimulus includes text describing this process and an animation showing the movement of water through the plant and the movement of water molecules across a semipermeable membrane.




View with the magnifying glass:



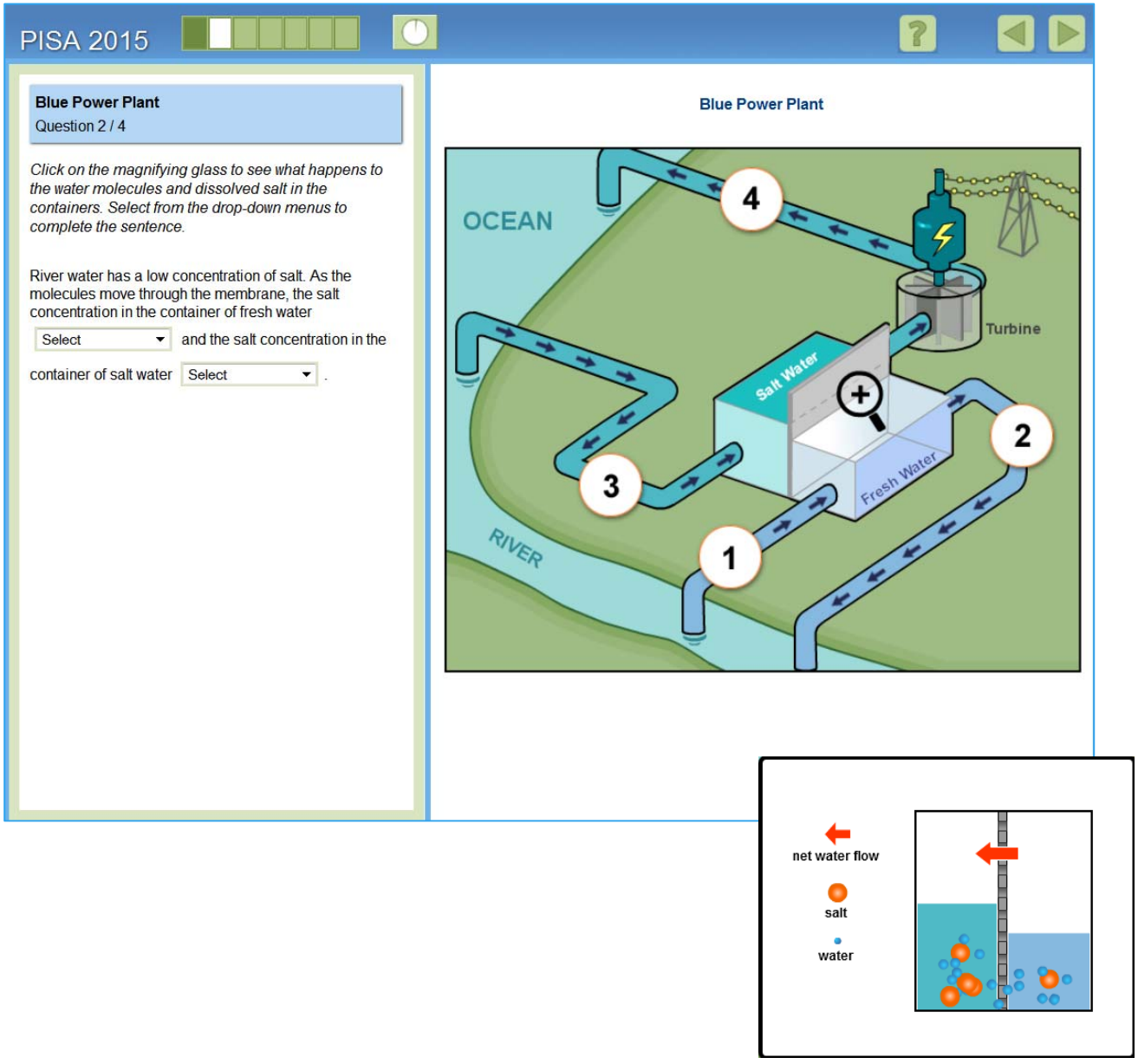
## Unit 639 *Blue Power Plant*
## Released Item #1




Students must apply their understanding of how water moves through the power plant presented in the diagram to identify *Location 2* and *Location 4* as containing water molecules from the river.

| | |
|---|---|
| *Item Number* | CS639Q01 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Content – Physical |
| *Context* | Local/National – Frontiers |
| *Cognitive Demand* | Low |
| *Item Format* | Complex Multiple Choice – Computer Scored |

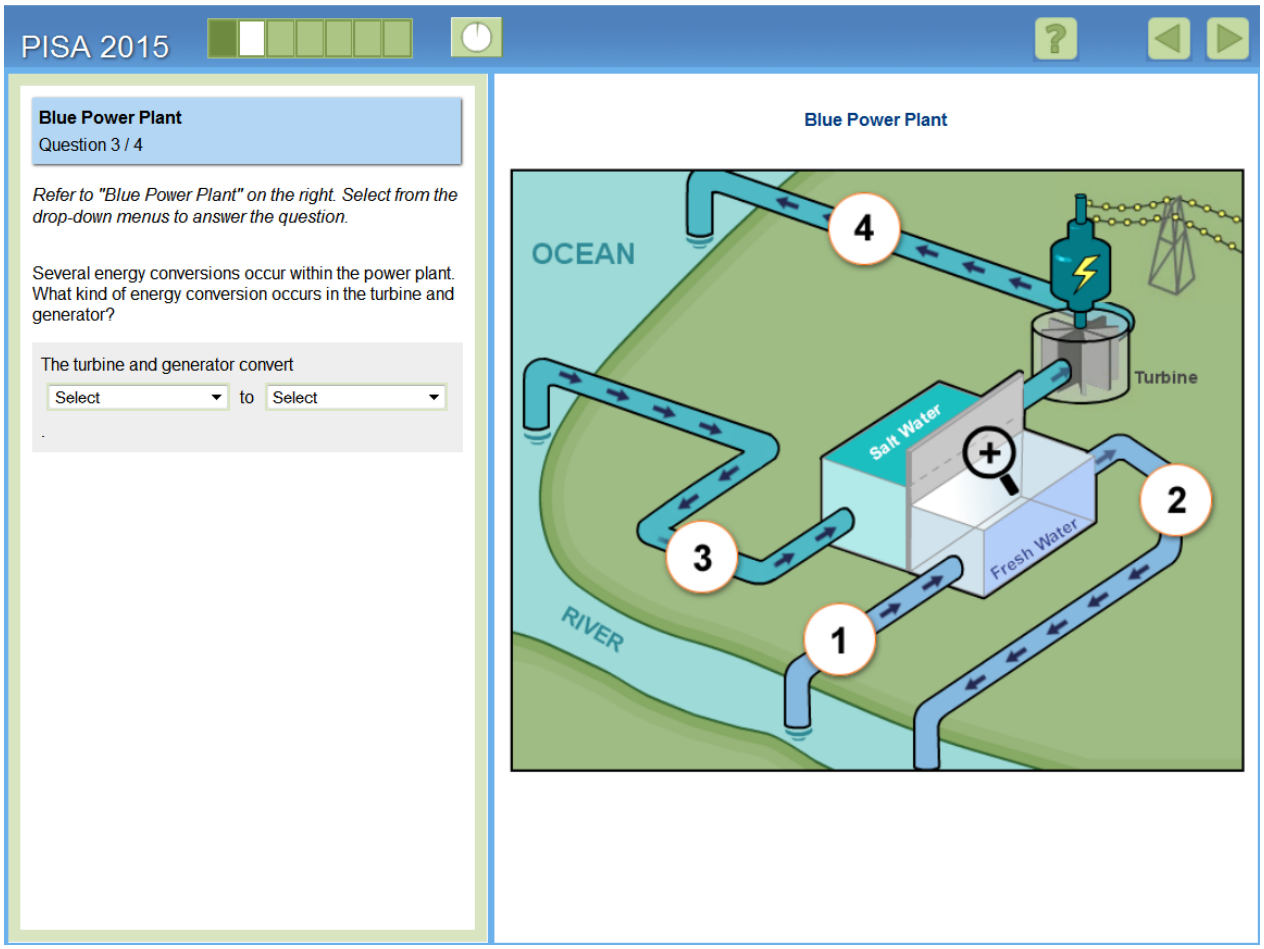
**Unit 639 *Blue Power Plant***
**Released Item #2**




Students are asked to use the animation to determine the effect the movement of water across the membrane on the salt concentration of the fresh water and the salt water. The correct response is: As the molecules move through the membrane, the salt concentration in the container of fresh water *increases* and the salt concentration in the container of salt water *decreases*.

| | |
|---|---|
| *Item Number* | CS639Q02 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Global – Frontiers |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

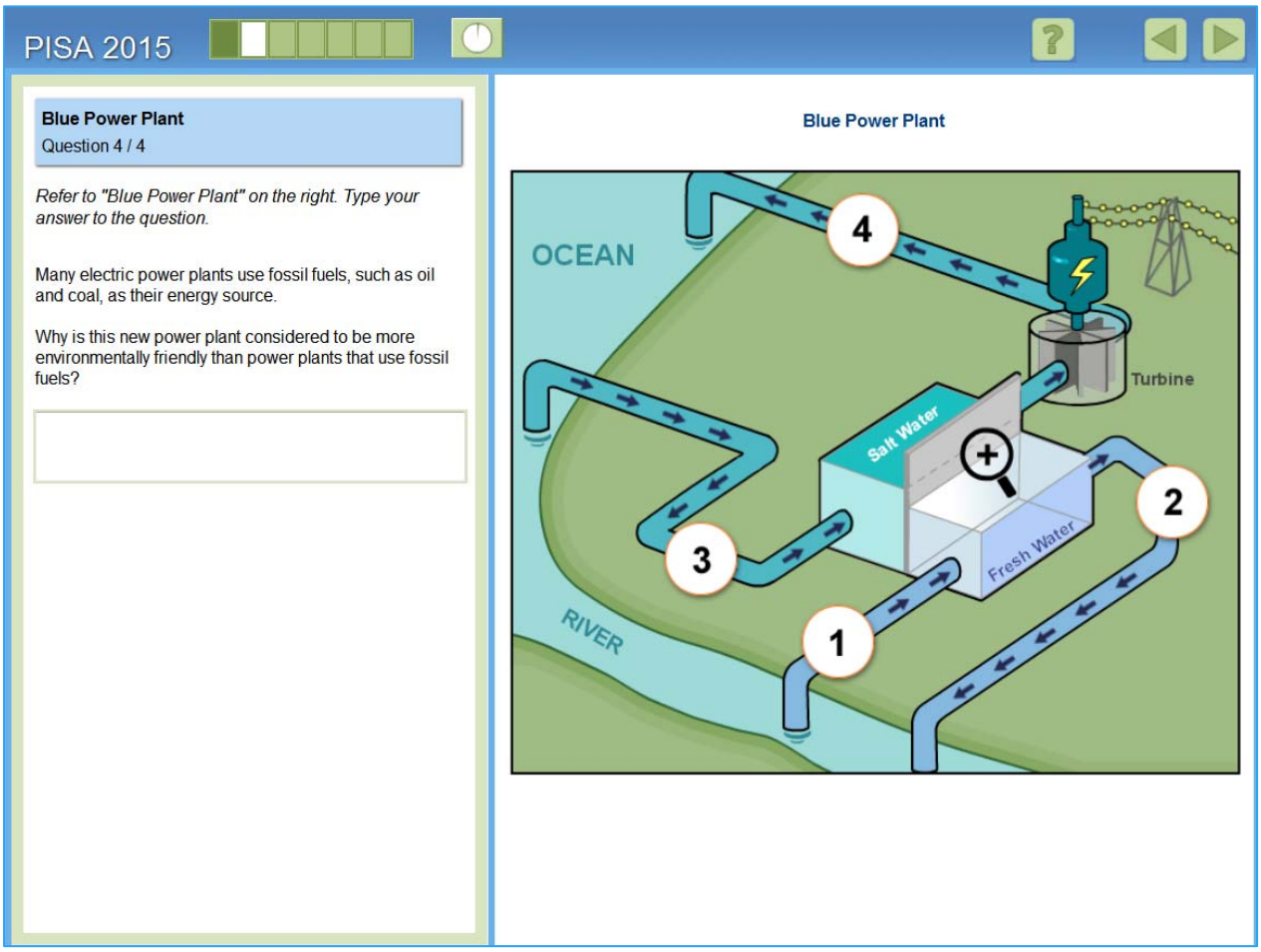
## Unit 639 *Blue Power Plant*
## Released Item #3




Each drop-down menu in this item lists four types of energy: gravitational, potential, kinetic and electrical. Students must correctly interpret the animated diagram and specify that the turbine and generator convert *kinetic* to *electrical* energy.

| | |
|---|---|
| *Item Number* | CS639Q04 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Content – Physical |
| *Context* | Local/National – Frontiers |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

**Unit 639 *Blue Power Plant***
**Released Item #4**

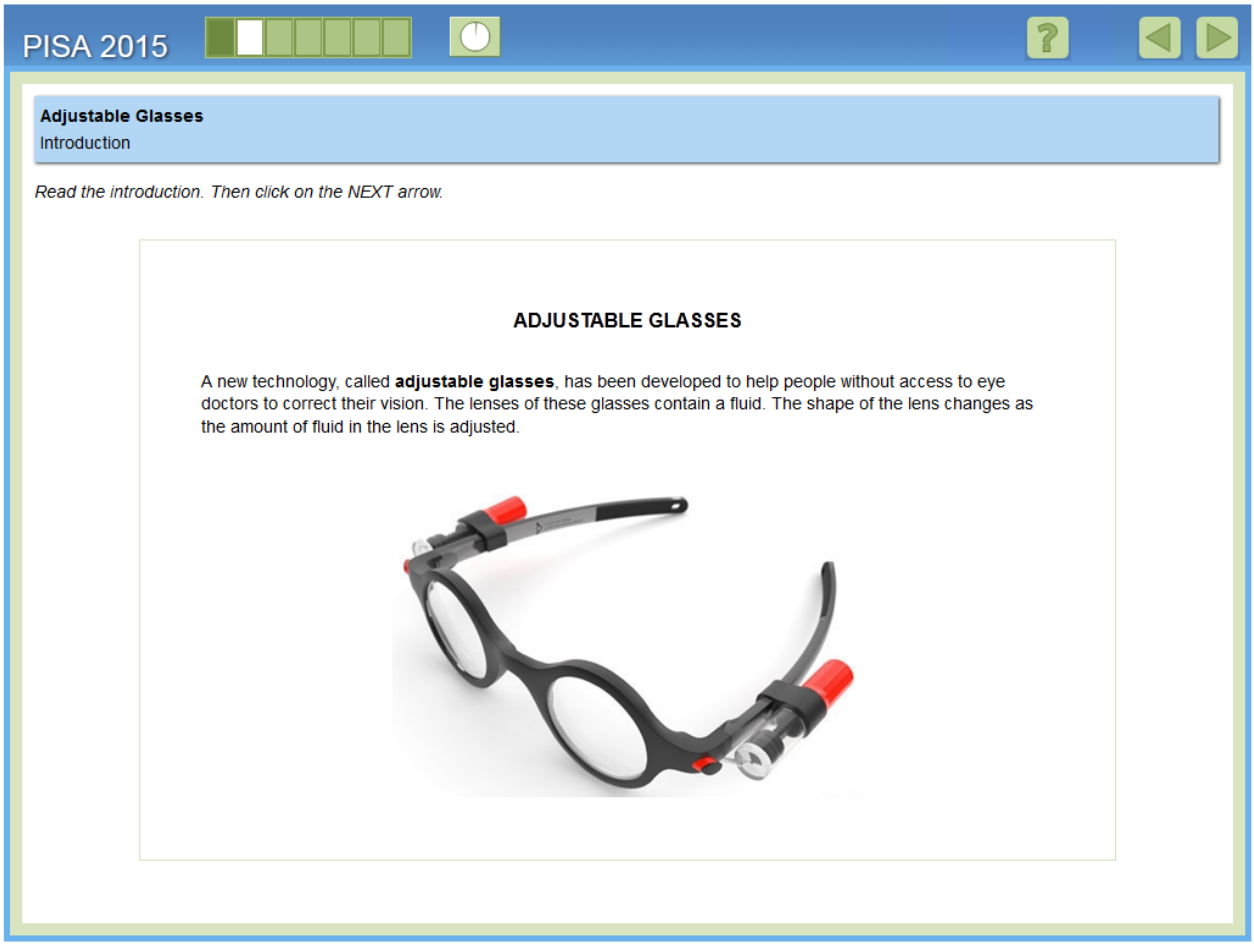



Students must provide an explanation that identifies a way in which plants that burn fossil fuel are more harmful to the environment than the new power plant illustrated in this unit, or identify a feature of the new power plant that makes it more environmentally friendly.

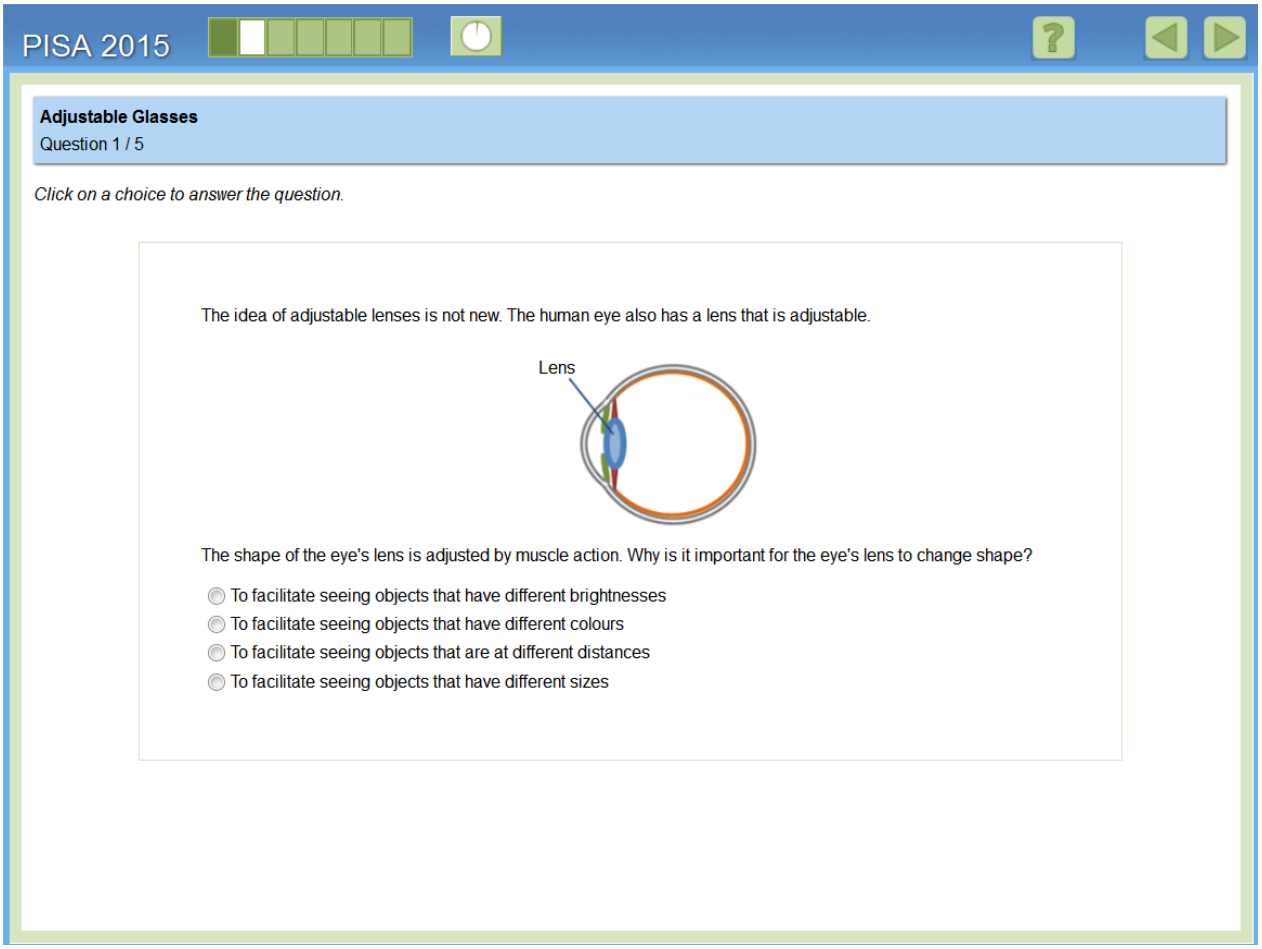
| | |
|---|---|
| *Item Number* | CS639Q05 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Physical |
| *Context* | Global – Frontiers |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

## Unit 621 *Adjustable Glasses*
## Unit Overview

This released unit describes an innovative type of eyeglasses that use fluid to adjust the shape of the lenses. The interactive portion of the unit first allows students to investigate the effect of adjusting the amount of fluid in the lens on the shape of the lens. Students are then able to investigate the effect of the lens adjustments on the vision of three different people: one with normal vision, one with farsighted vision, and one with nearsighted vision.



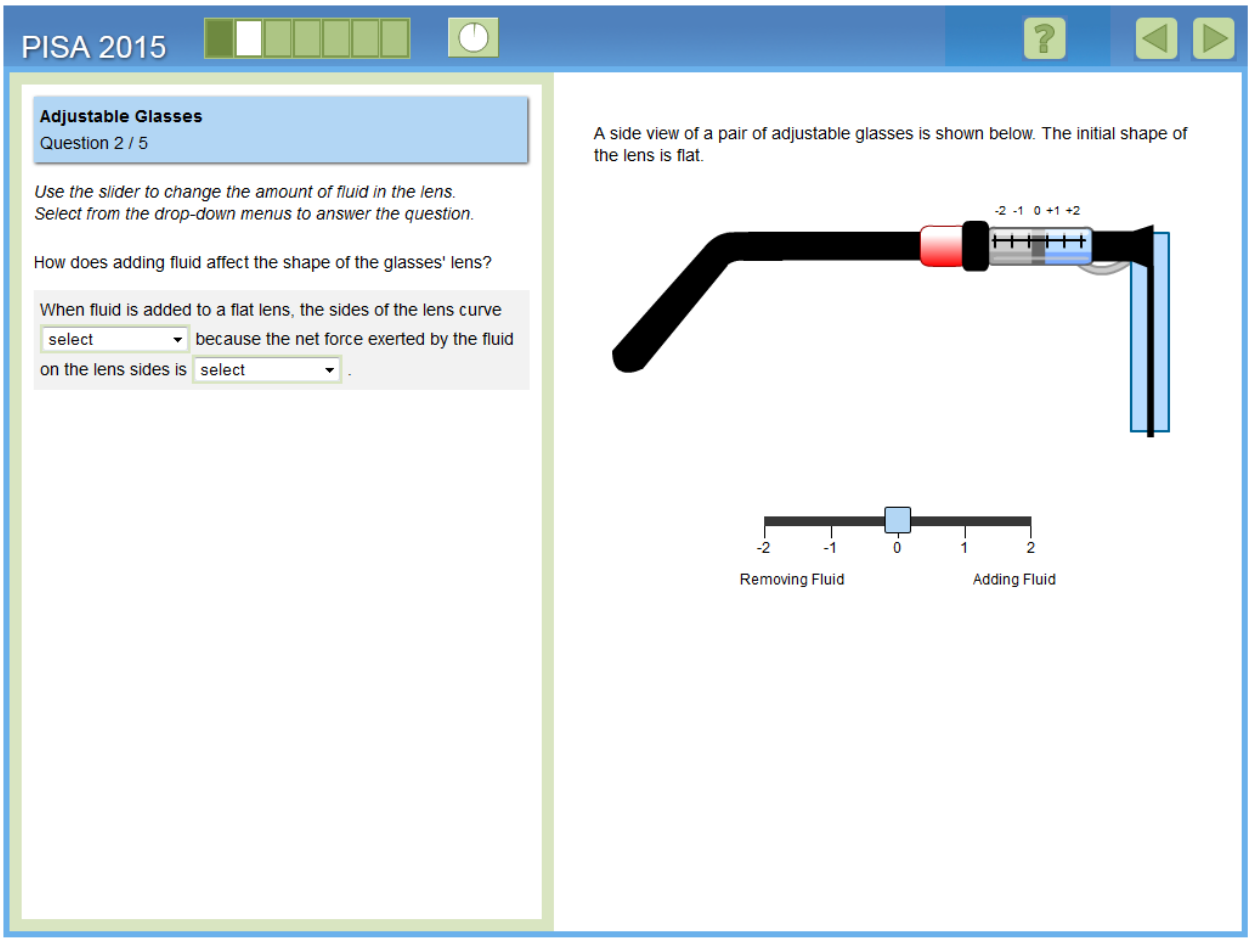
**Unit 621 *Adjustable Glasses***
**Released Item #1**




Students must use content knowledge to correctly identify the third option, that the eye's lens must change shape *to facilitate seeing objects at different distances*.

| | |
|---|---|
| *Item Number* | CS621Q01 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Living |
| *Context* | Personal – Health and Disease |
| *Cognitive Demand* | Low |
| *Item Format* | Simple Multiple Choice – Computer Scored |

## Unit 621 *Adjustable Glasses*
## Released Item #2

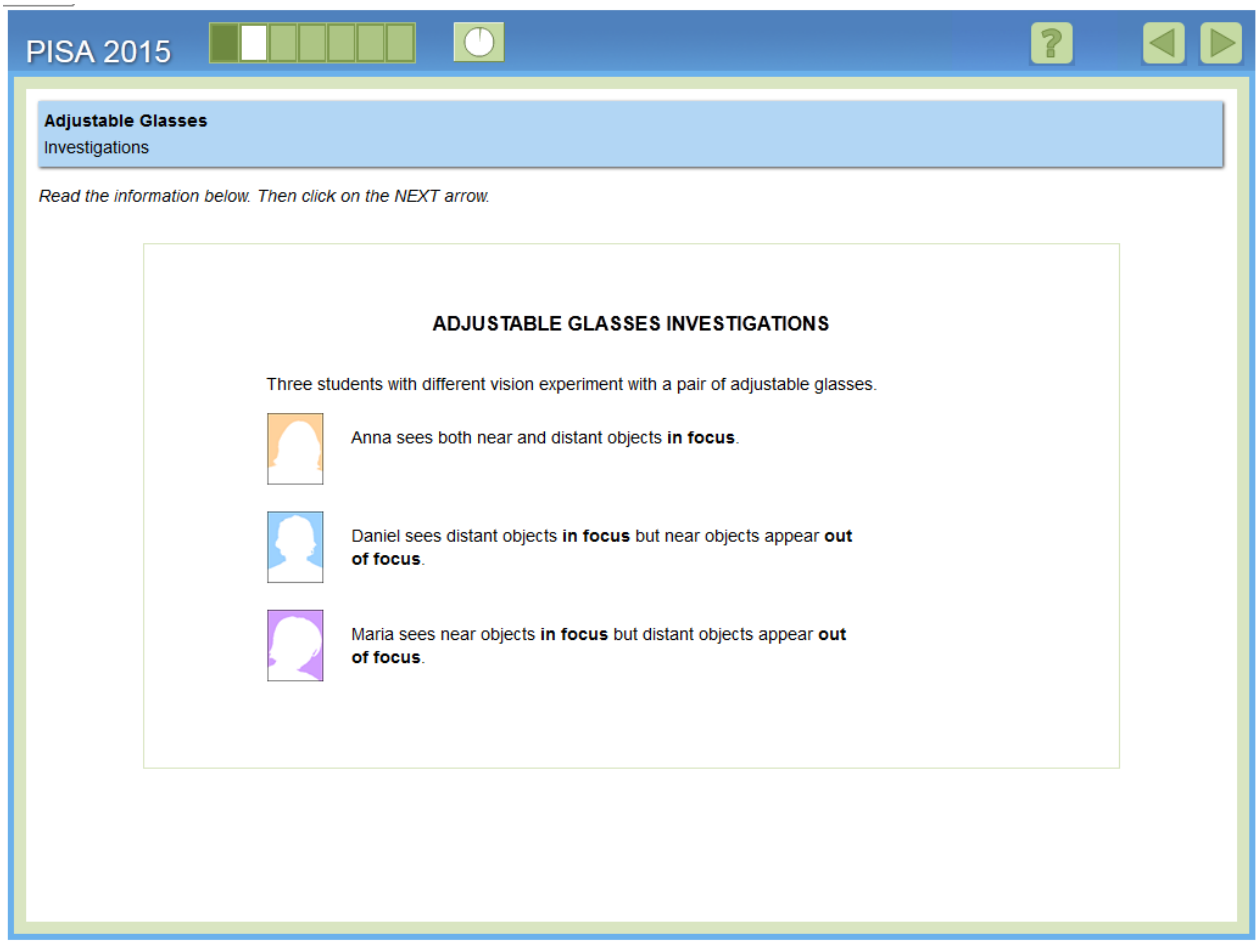



The options in the drop-down menus are outward and inward for the first menu and more and less for the second. Using the simulated adjustable glasses, students are asked to determine that when fluid is added to a flat lens, the sides of the lens curve *outward* and then interpret the simulation to specify that this is because the net force exerted by the fluid on the lens is *more*.

| | |
|---|---|
| *Item Number* | CS621Q02 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Content – Physical |
| *Context* | Personal – Frontiers |
| *Cognitive Demand* | Low |
| *Item Format* | Complex Multiple Choice – Computer Scored |

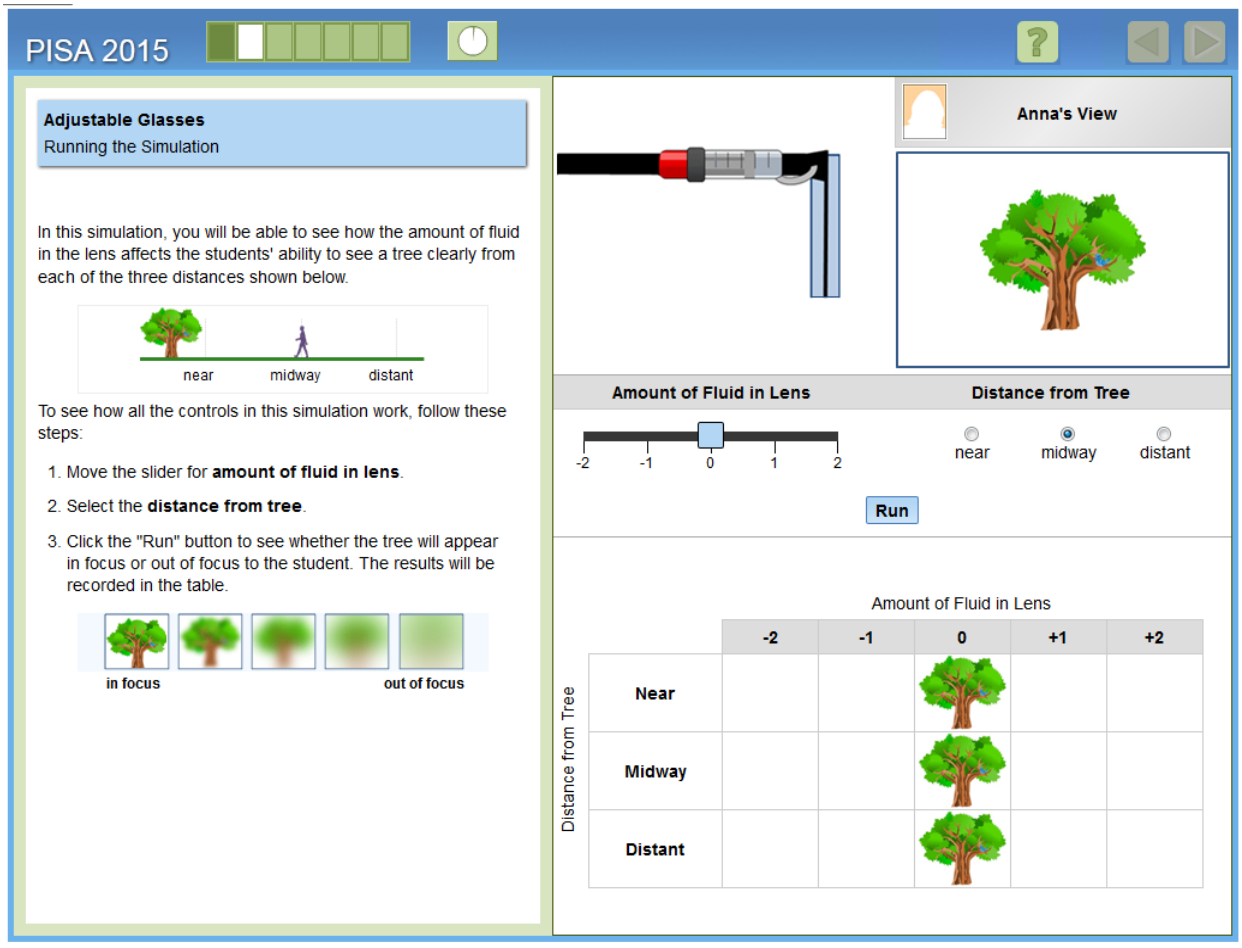
## Unit 621 *Adjustable Glasses*
## Introduction to second simulation

The introduction provides information about the vision of three students, each of whom will be investigated using the simulation.

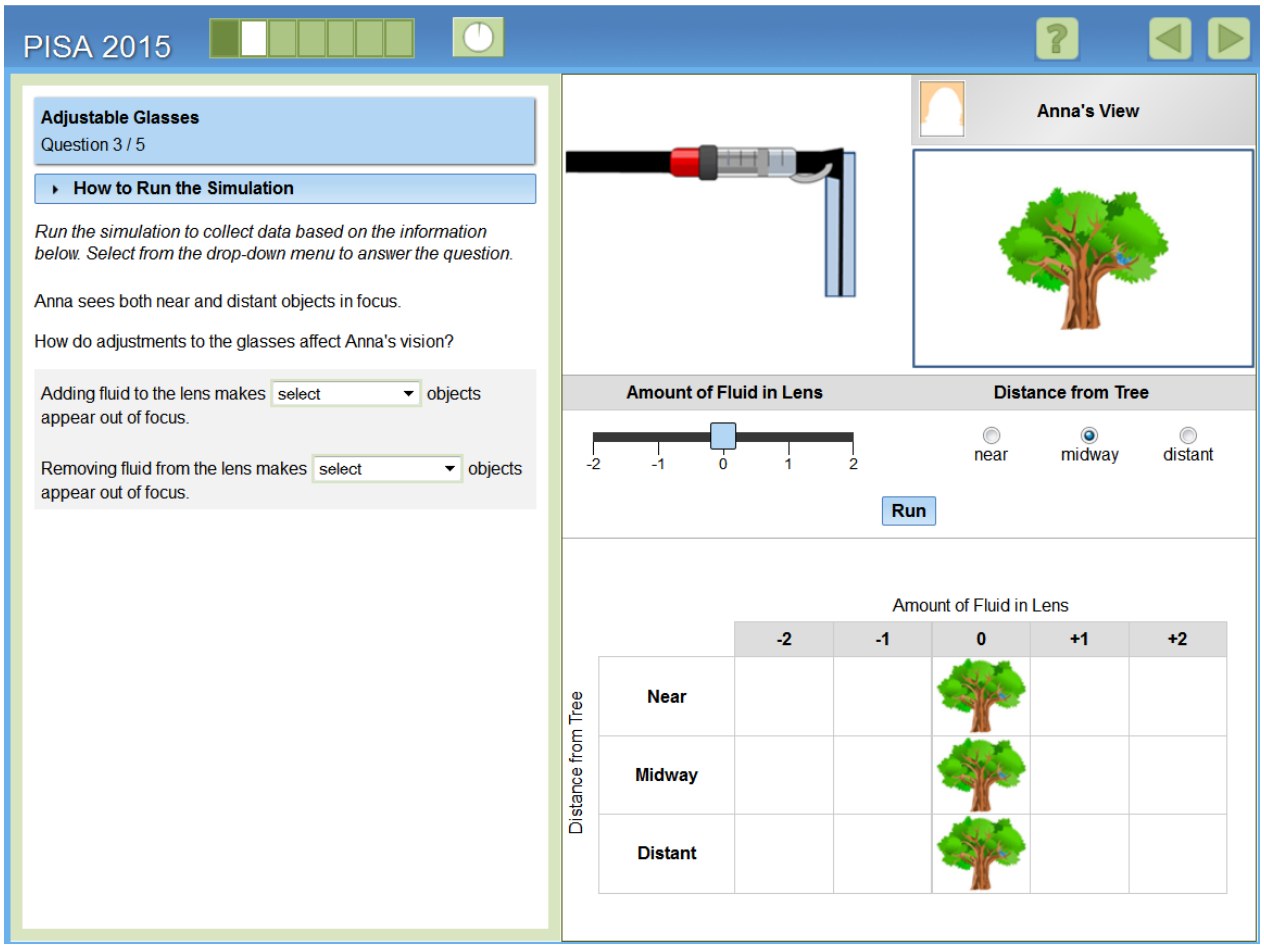


## Unit 621 *Adjustable Glasses*
## How to Run the Simulation

Before beginning this part of the unit, students are provided with a brief introduction to the controls in the simulation and are allowed to practice setting each control. Help messages display if students do not take the requested actions within 1 minute. If students time out by not acting at all within 2 minutes, they are shown what the simulation would look like if the controls were set as specified. As explained in the orientation, reminders about how to use the controls are available on subsequent screens by clicking on the "How to Run the Simulation" tab.



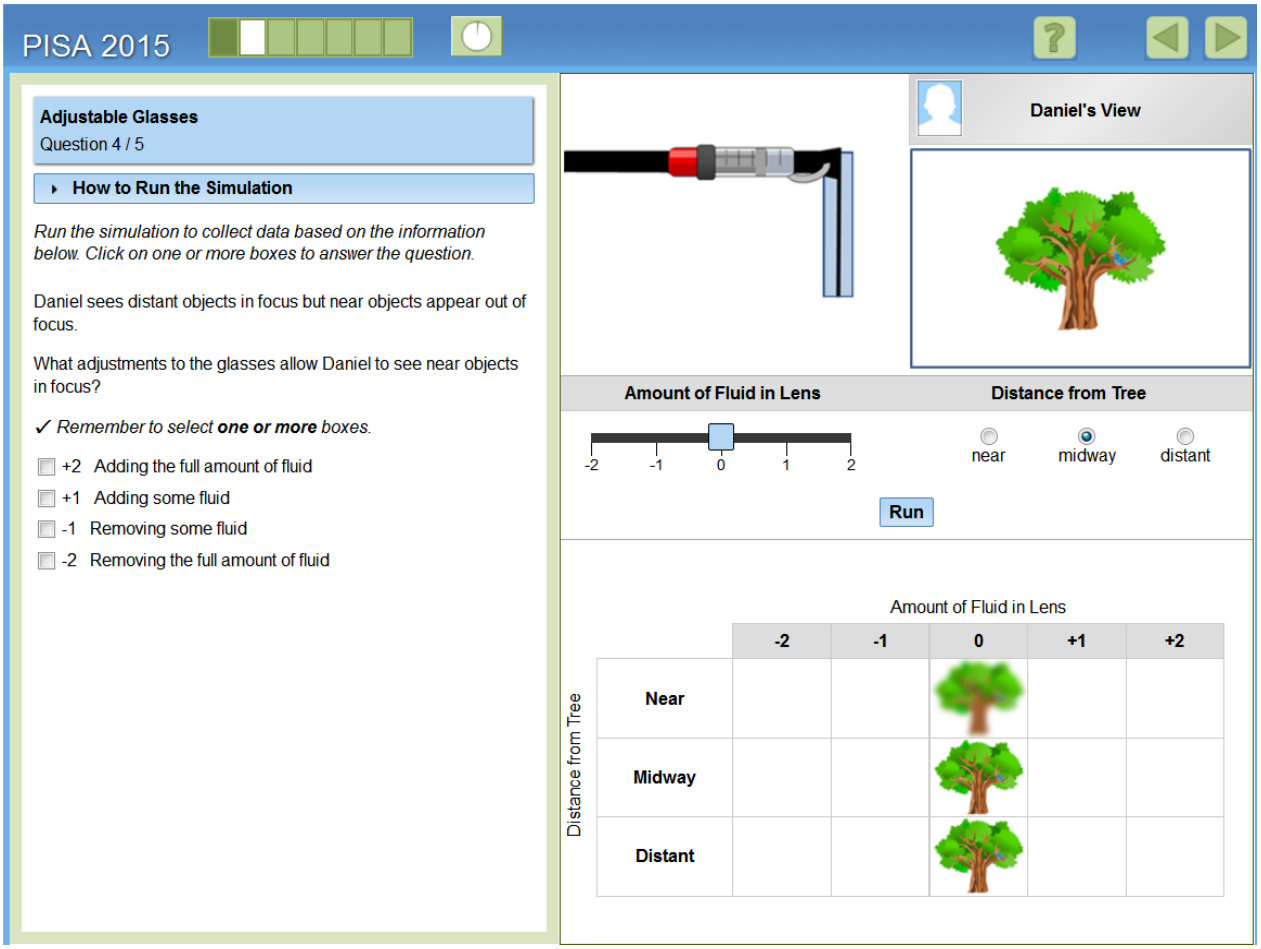
**Unit 621 *Adjustable Glasses***
**Released Item #3**




The two drop-down menus have the same options: distant and near. Students are asked to use the simulation and the data they generate to identify that adding fluid makes *distant* objects appear out of focus for Anna and removing fluid makes *near* objects appear out of focus.

| | |
|---|---|
| *Item Number* | CS621Q03 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Personal – Frontiers |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

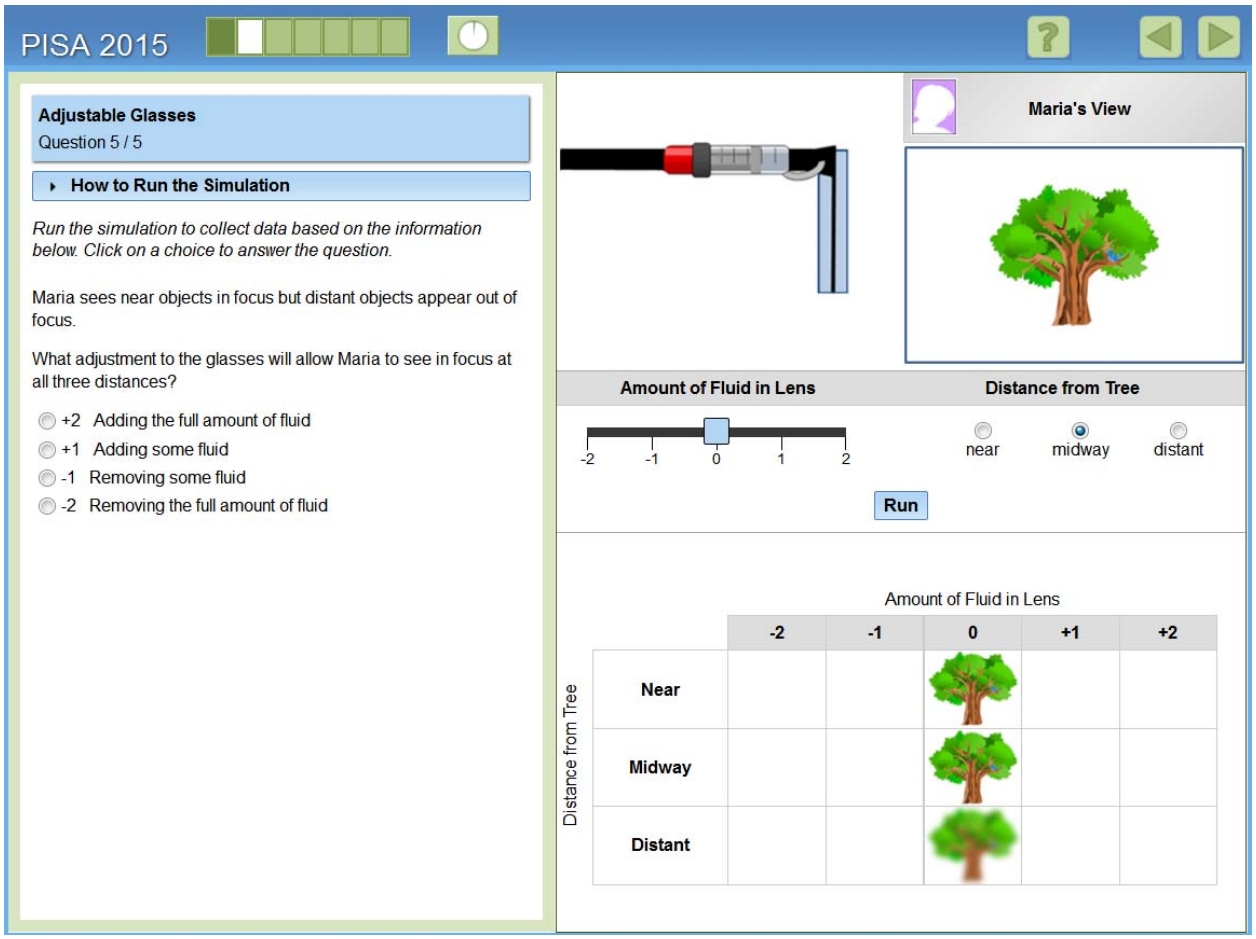
## Unit 621 *Adjustable Glasses*
## Released Item #4




Students are asked to use the simulation to identify the adjustments that will improve Daniel's near vision. There are two correct responses: *+2 Adding the full amount of fluid* and *+1 Adding some fluid*.

| | |
|---|---|
| *Item Number* | CS621Q04 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Personal – Frontiers |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

## Unit 621 *Adjustable Glasses*
## Released Item #5

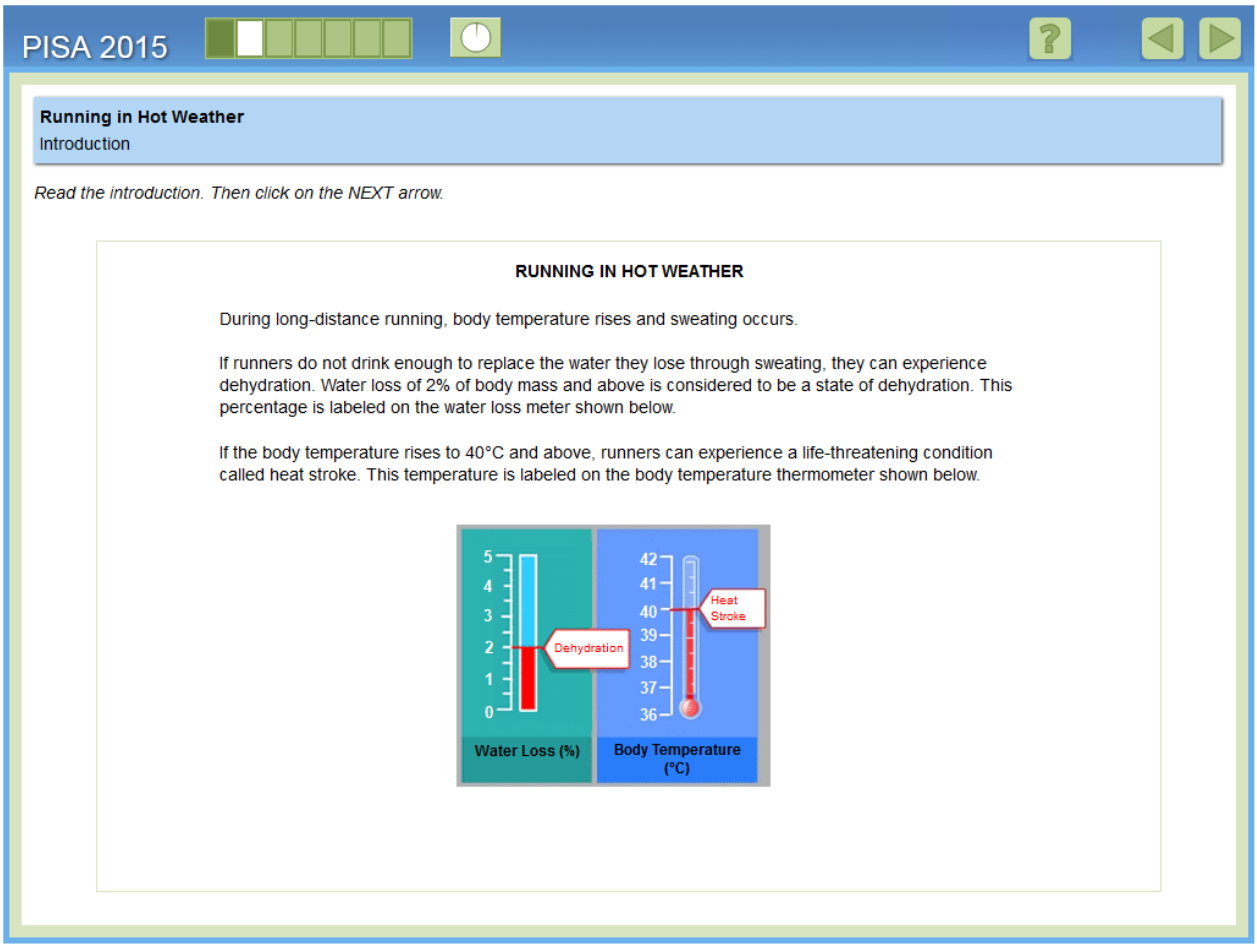



Students are asked to use the simulation and the data they generate to identify the adjustments that will improve Maria's distant vision. In this case there is one correct response: *-1 Removing some fluid*

| | |
|---|---|
| *Item Number* | CS621Q05 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Personal – Frontiers |
| *Cognitive Demand* | Medium |
| *Item Format* | Simple Multiple Choice – Computer Scored |

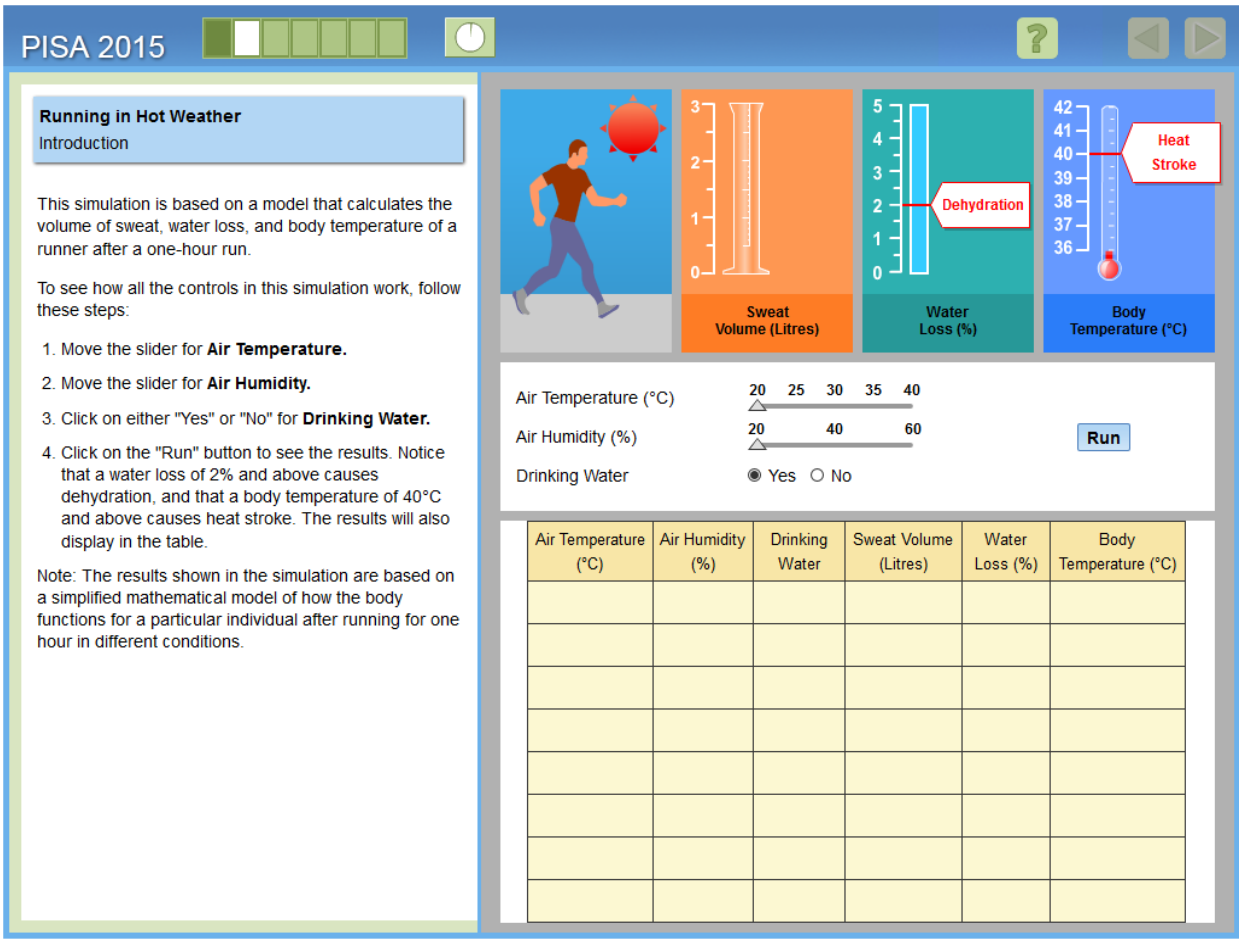
## Unit 623 *Running in Hot Weather*
## Unit Overview

This released unit presents a scientific enquiry related to thermoregulation using a simulation that allows students to manipulate the air temperature and air humidity levels experienced by long-distance runners, as well as whether or not the simulated runner drinks water. The student selects the air temperature, air humidity, and whether the runner is drinking water (yes/no). After running the simulation the runner's sweat volume, water loss and body temperature are displayed. When the conditions trigger dehydration or heat stroke, those health dangers are highlighted in the display.

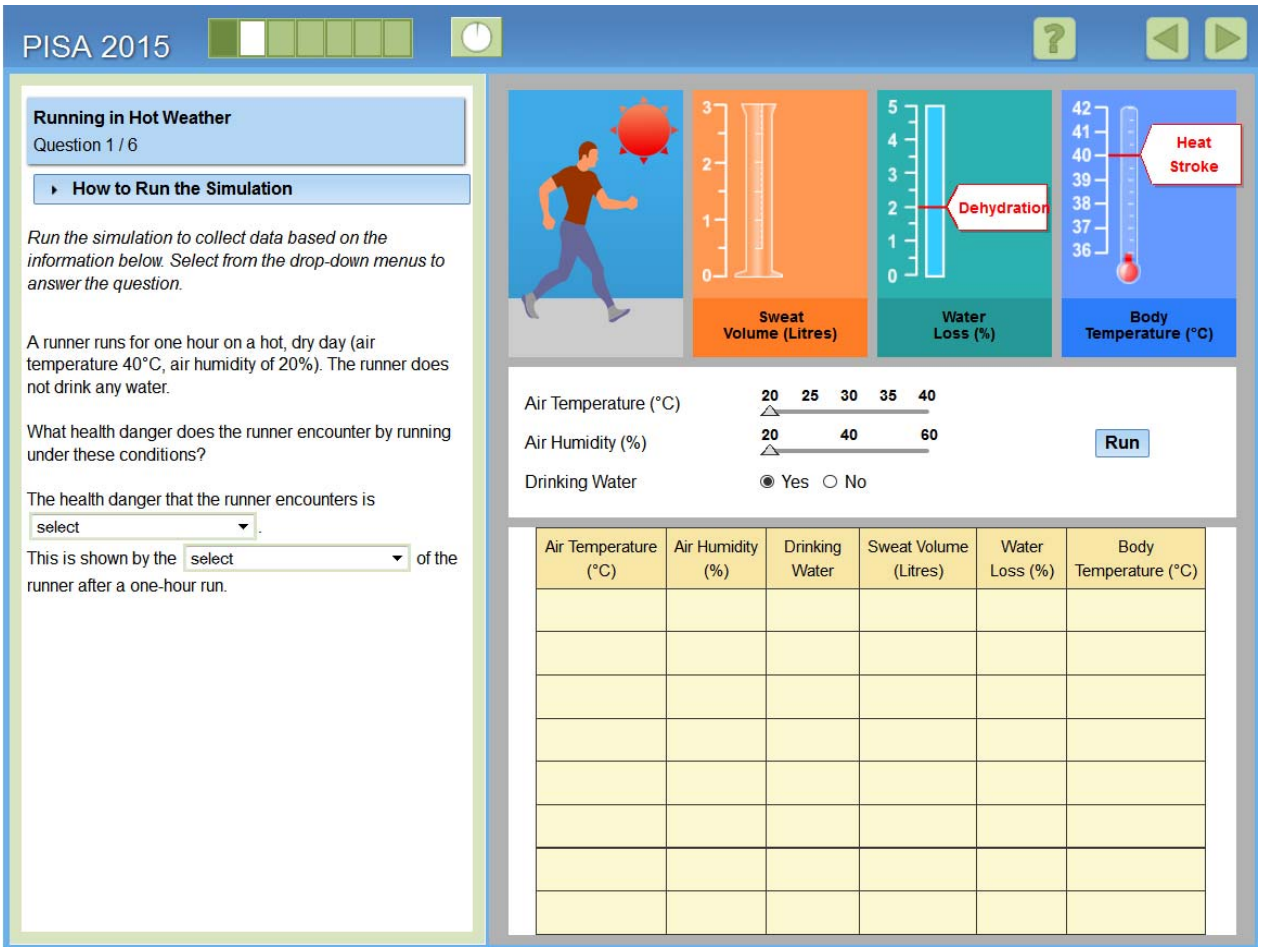


## Unit 623 *Running in Hot Weather*
## How to Run the Simulation

Before beginning the unit, students are provided with a brief introduction to the controls in the simulation and are allowed to practice setting each control. Help messages display if students do not take the requested actions within 1 minute. If students time out by not not acting at all within 2 minutes, they are shown what the simulation would look like if the controls were set as specified. As explained in the orientation, reminders about how to use the controls, as well as how to select or delete a row of data, are available on subsequent screens by clicking on the "How to Run the Simulation" tab.



## Unit 623 *Running in Hot Weather*
## Released Item #1

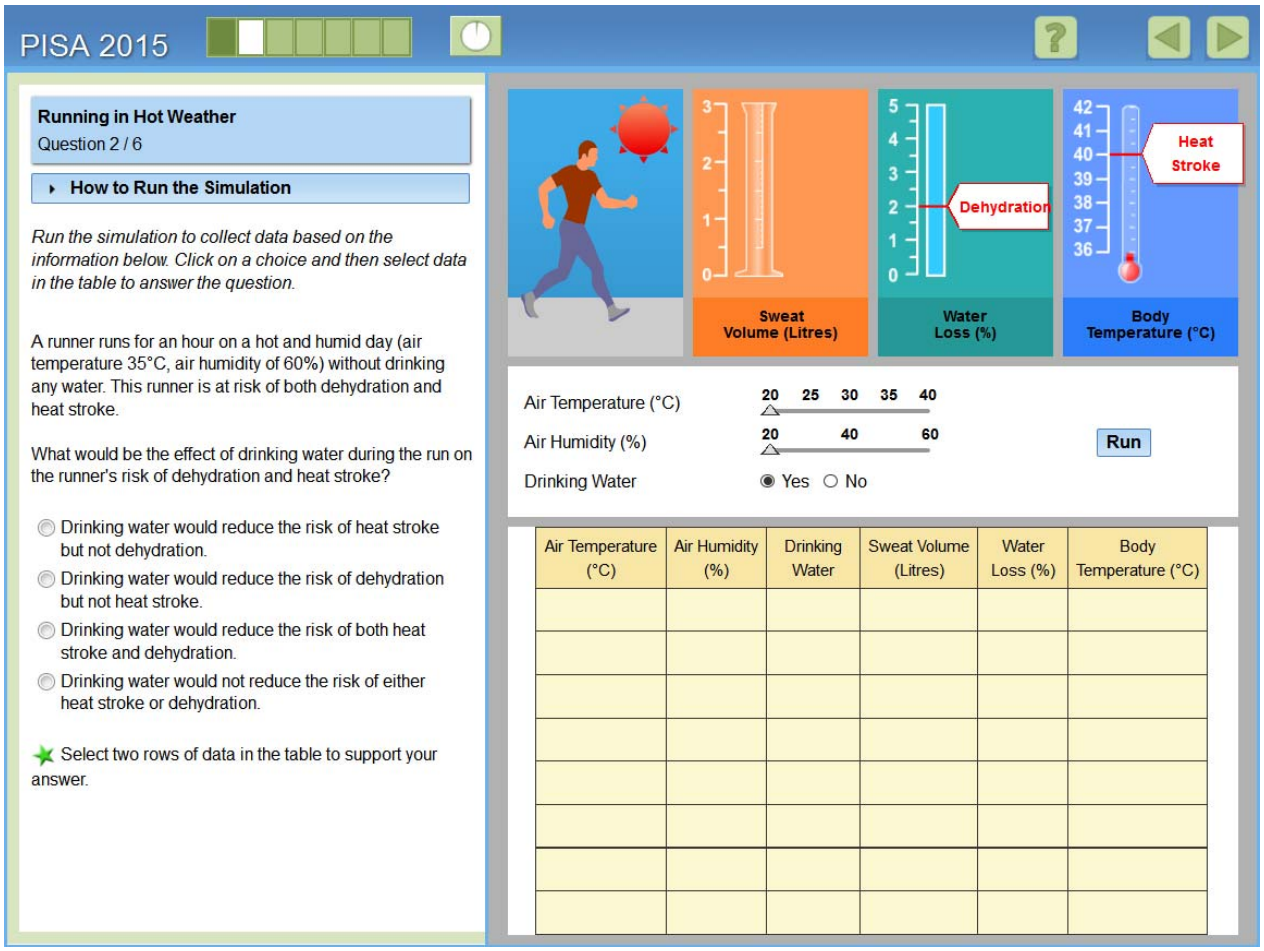



Students are asked to use the simulation to determine whether the person running under the described conditions is in danger of either dehydration or heat stroke. They are also asked to specify whether this is shown by the runner's sweat volume, water loss or body temperature. The available options in the drop-down menus are: dehydration/heat stroke and sweat volume/water loss/body temperature.

The correct response is that the health danger is *dehydration* as shown by the runner's *water loss*.

| | |
|---|---|
| *Item Number* | CS623Q01 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Personal – Health and Disease |
| *Cognitive Demand* | Low |
| *Item Format* | Complex Multiple Choice – Computer Scored |

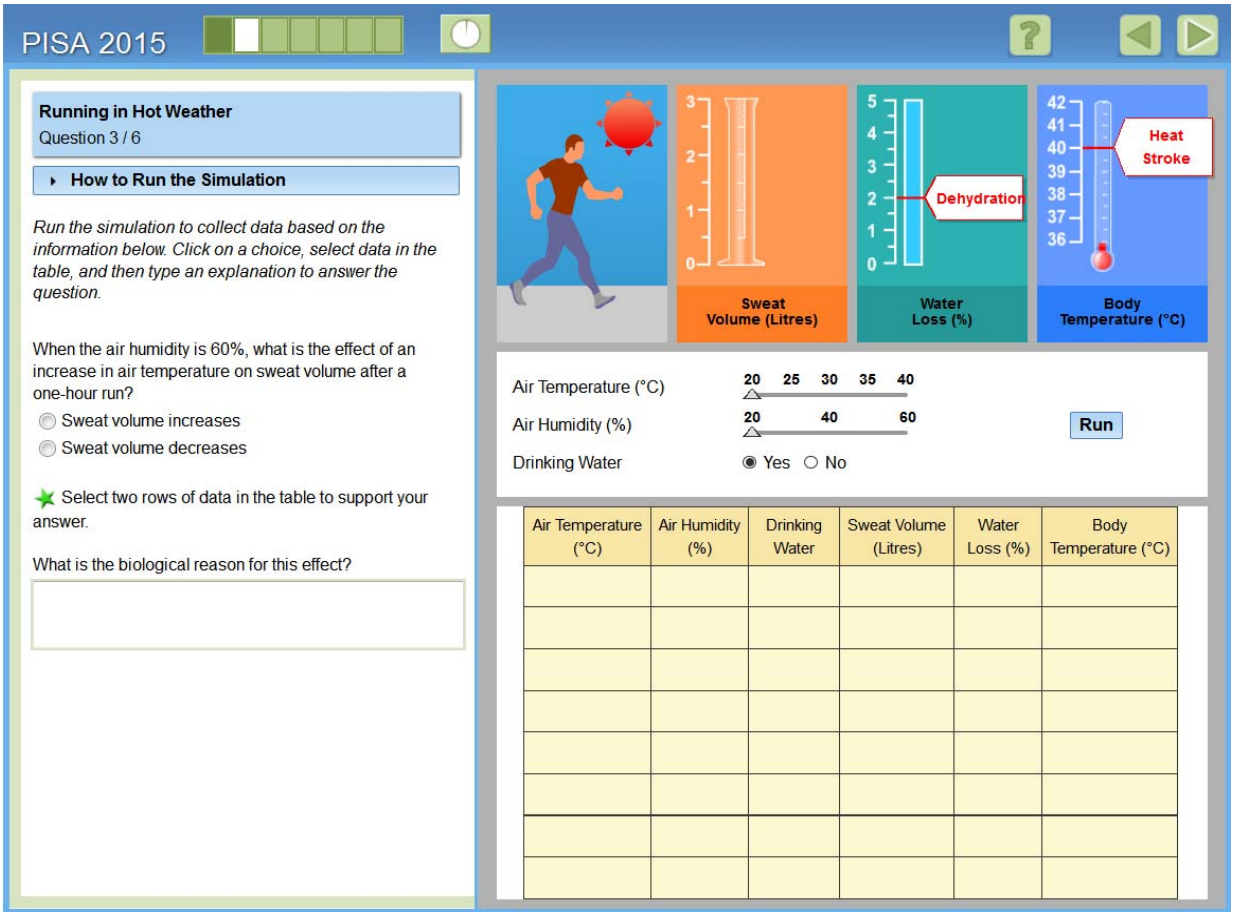
## Unit 623 *Running in Hot Weather*
## Released Item #2




Students are asked to run the simulation holding the air temperature and humidity constant while varying whether or not the runner drinks water. They must use the data they generate to identify that the second option is correct: *Drinking water would reduce the risk of dehydration but not heat stroke.* In support of their response, they must also select two rows of data where drinking water is set to "No" in one case and "Yes" in the other, with an air temperature of 35°C and air humidity of 60% for both rows.

| | |
|---|---|
| *Item Number* | CS623Q02 |
| *Competency* | Explain Phenomena Scientifically |
| *Knowledge – System* | Content – Living |
| *Context* | Personal – Health and Disease |
| *Cognitive Demand* | Low |
| *Item Format* | Simple Multiple Choice and Open Response - Computer Scored |

## Unit 623 *Running in Hot Weather*
## Released Item #3



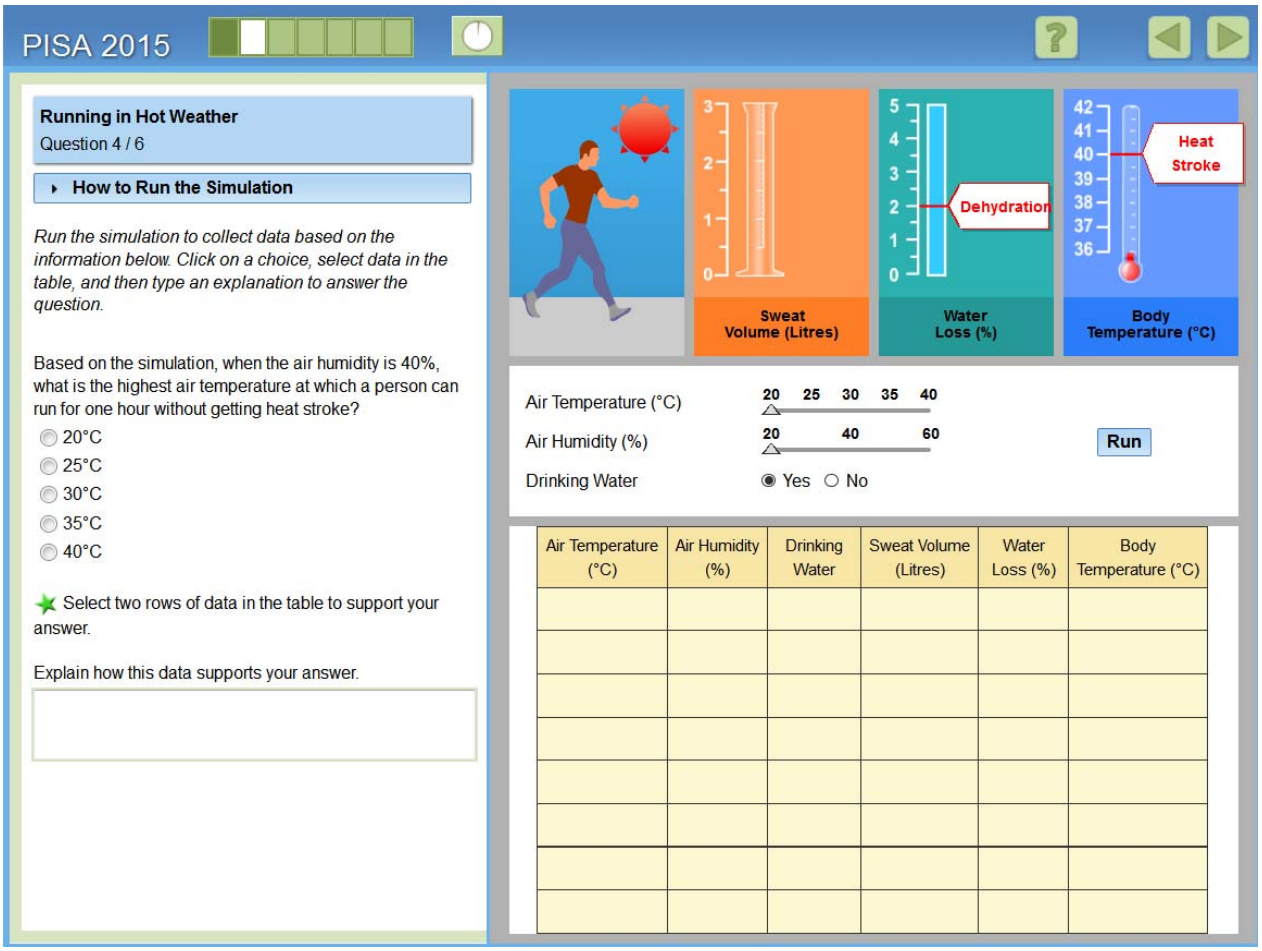

This item includes two separately coded questions: CS623Q03 includes the multiple-choice question and selection of data to support that answer; CS623Q04. asks students to explain the reason that sweat volume increases under the specified conditions. Unlike the previous questions, only humidity is specified. Students must investigate how varying air temperatures impact sweat volume.

The correct response for CS623Q03 is that *sweat volume increases* when air temperature increases at 60% humidity and the selected rows of data must include one row with a temperature set to a lower number and one to a higher number, with both at a 60% humidity level (e.g., 20°C at 60% and 25°C at 60% or 35°C at 60% and 40°C at 60% )

For CS623Q04, students must explain that sweating is a mechanism used by the body to lower body temperature as the biological reason for this increase in sweat volume at higher temperatures.

| | |
|---|---|
| *Item Number* | CS623Q03 and CS623Q04 |
| *Competency* | Q03: Evaluate and Design Scientific Enquiry<br>Q04: Explain Phenomena Scientifically |
| *Knowledge – System* | Q03: Procedural<br>Q04: Content – Living |
| *Context* | Personal – Health and Disease |
| *Cognitive Demand* | Medium |
| *Item Format* | Q03: Simple Multiple Choice and Open Response – Computer Scored<br>Q04: Open Response – Human Coded |

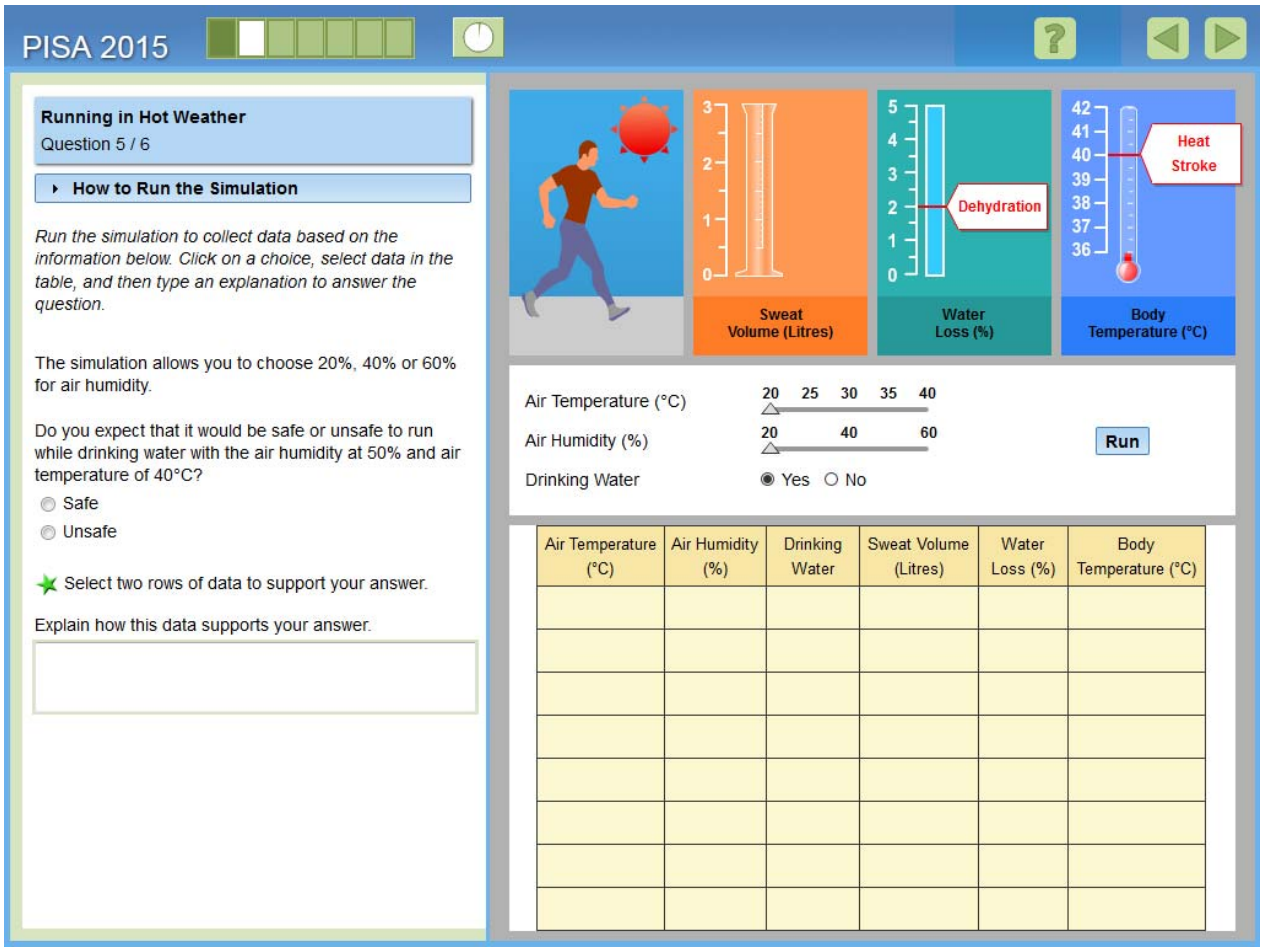
## Unit 623 *Running in Hot Weather*
## Released Item #4




Students are asked to use the simulation to identify the highest temperature at which a person can run without getting heat stroke when the humidity is 40%. The correct response is *35°C* and students must select the following two rows of data to support their response: 35°C air temperature - 40% humidity and 40°C air temperature - 40% humidity. They must further explain how the selected rows of data support their answer by indicating that at 40% humidity moving the air temperature up from 35°C to 40°C causes heat stroke.

| | |
|---|---|
| *Item Number* | CS623Q05 |
| *Competency* | Evaluate and Design Scientific Enquiry |
| *Knowledge – System* | Procedural |
| *Context* | Personal – Health and Disease |
| *Cognitive Demand* | Medium |
| *Item Format* | Open Response – Human Coded |

## Unit 623 *Running in Hot Weather*
## Released Item #5[3]



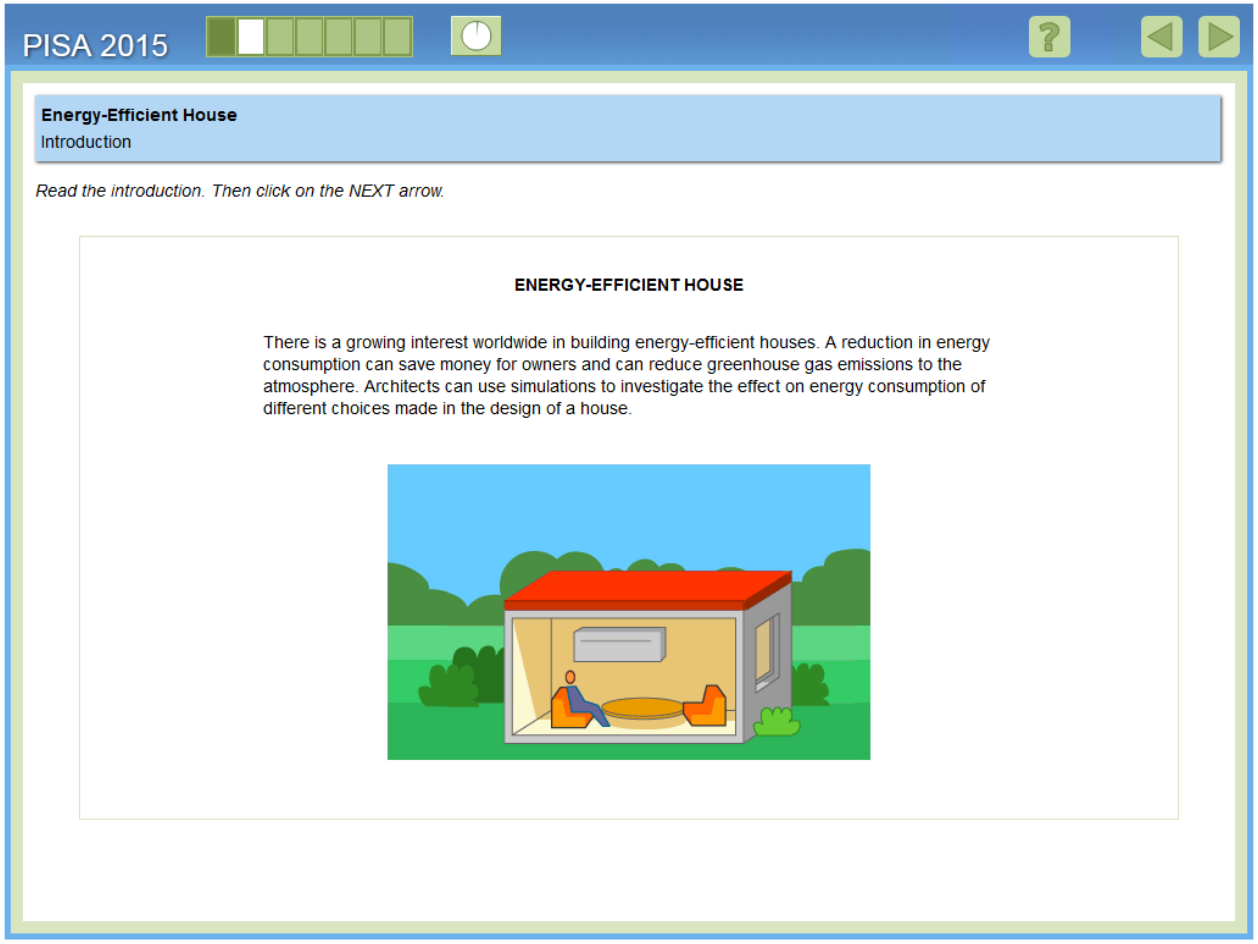

Students use the simulation to develop a hypothesis about the safety of running at 40°C at 50% humidity (a humidity value that cannot be set on the slider). By testing the humidity levels below and above 50% at 40°C, students can conclude that it would be *unsafe* to run at 40°C, even while drinking water. To support this response, they must select one row with 40% humidity at 40°C with drinking water set to "Yes" and a second with 60% humidity at 40°C with drinking water set to "Yes". The explanation must indicate that, given that the runner would suffer from heat stroke at both 40% and 60% humidity at 40°C while drinking water; there is a risk of heat stroke at 50% humidity under those same conditions.

| | |
|---|---|
| *Item Number* | CS623Q06 |
| *Competency* | Evaluate and Design Scientific Enquiry |
| *Knowledge – System* | Procedural |
| *Context* | Personal – Health and Disease |
| *Cognitive Demand* | High |
| *Item Format* | Open Response – Human Coded |

[3] Note that the last item in this unit, CS623Q08, is not included among the released items.

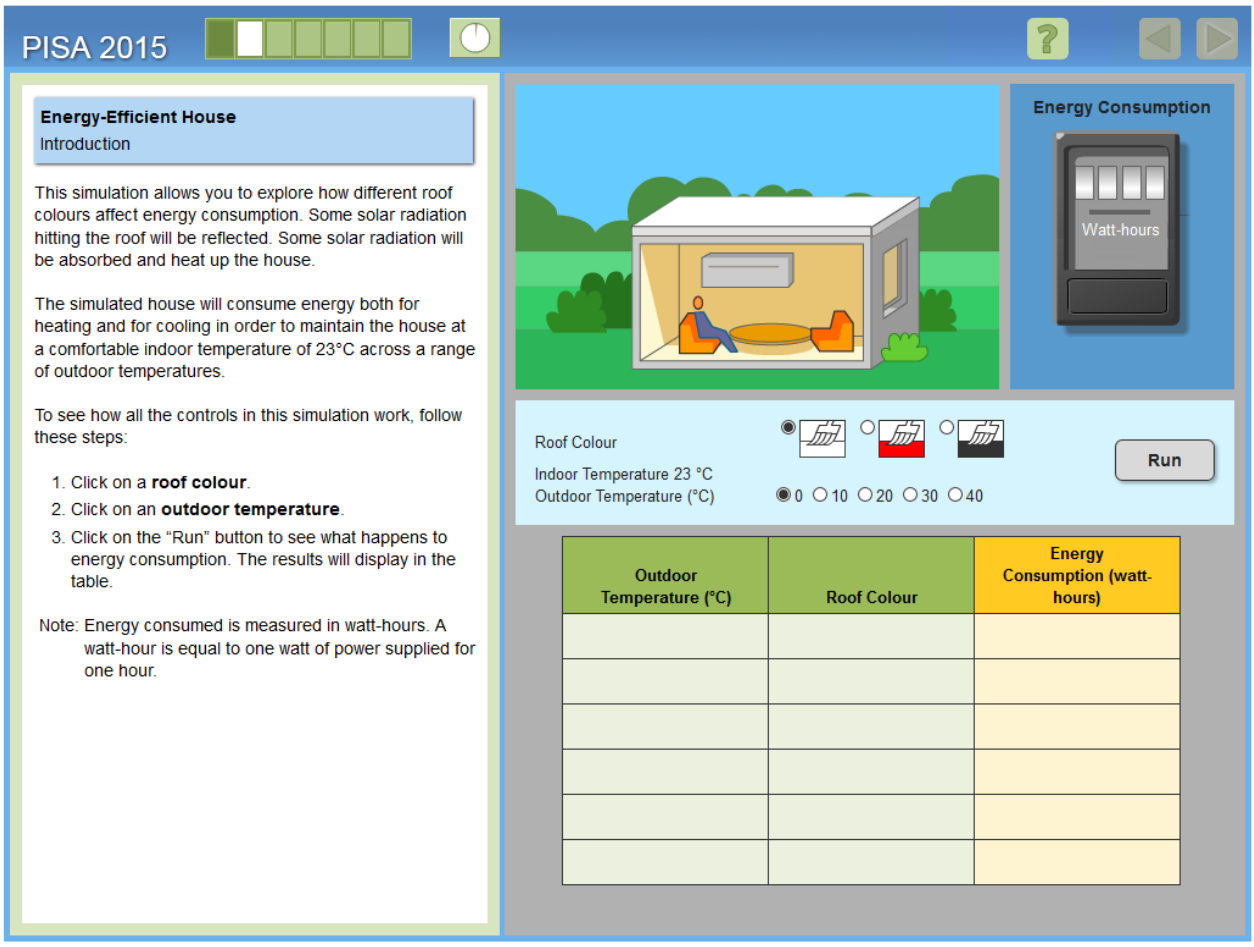
## Unit 633 *Energy-Efficient House*
## Unit Overview

This released unit focuses on how different roof colours affect energy consumption. The simulation allows students to investigate the effect of roof colour on the amount of energy needed to heat or cool a house to a constant temperature of 23°C. For each trial, the student selects a roof colour and outside temperature. After pressing "Run," the simulation displays energy consumption at the selected colour and temperature.

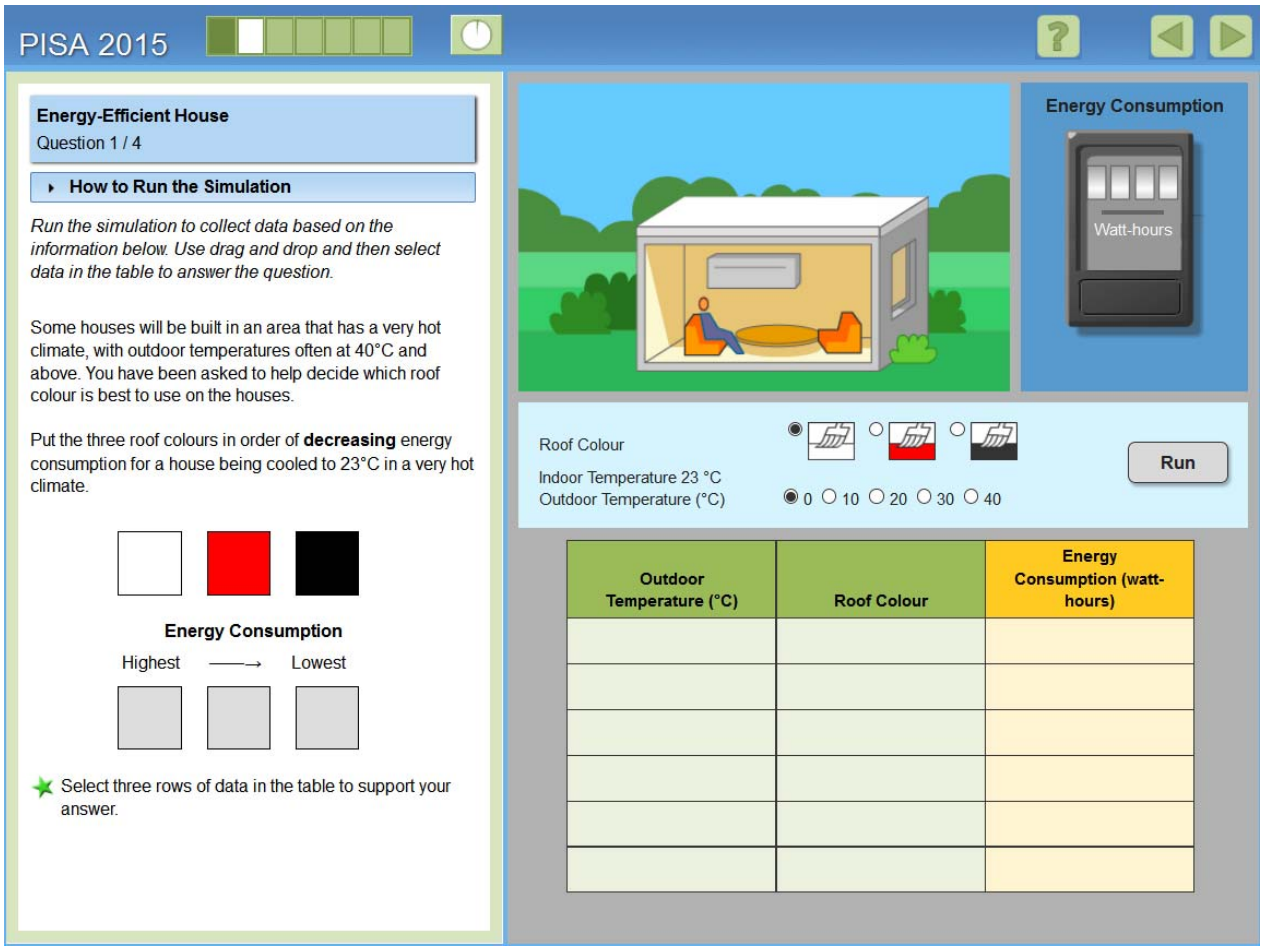


## Unit 633 *Energy-Efficient House*
## How to Run the Simulation

Before beginning the unit, students are provided with a brief introduction to the controls in the simulation and are allowed to practice setting each control. Help messages display if students do not take the requested actions within 1 minute. If students time out by not acting at all within 2 minutes, they are shown what the simulation would look like if the controls were set as specified. As explained in the orientation, reminders about how to use the controls, as well as how to select or delete a row of data, are available on subsequent screens by clicking on the "How to Run the Simulation" tab.



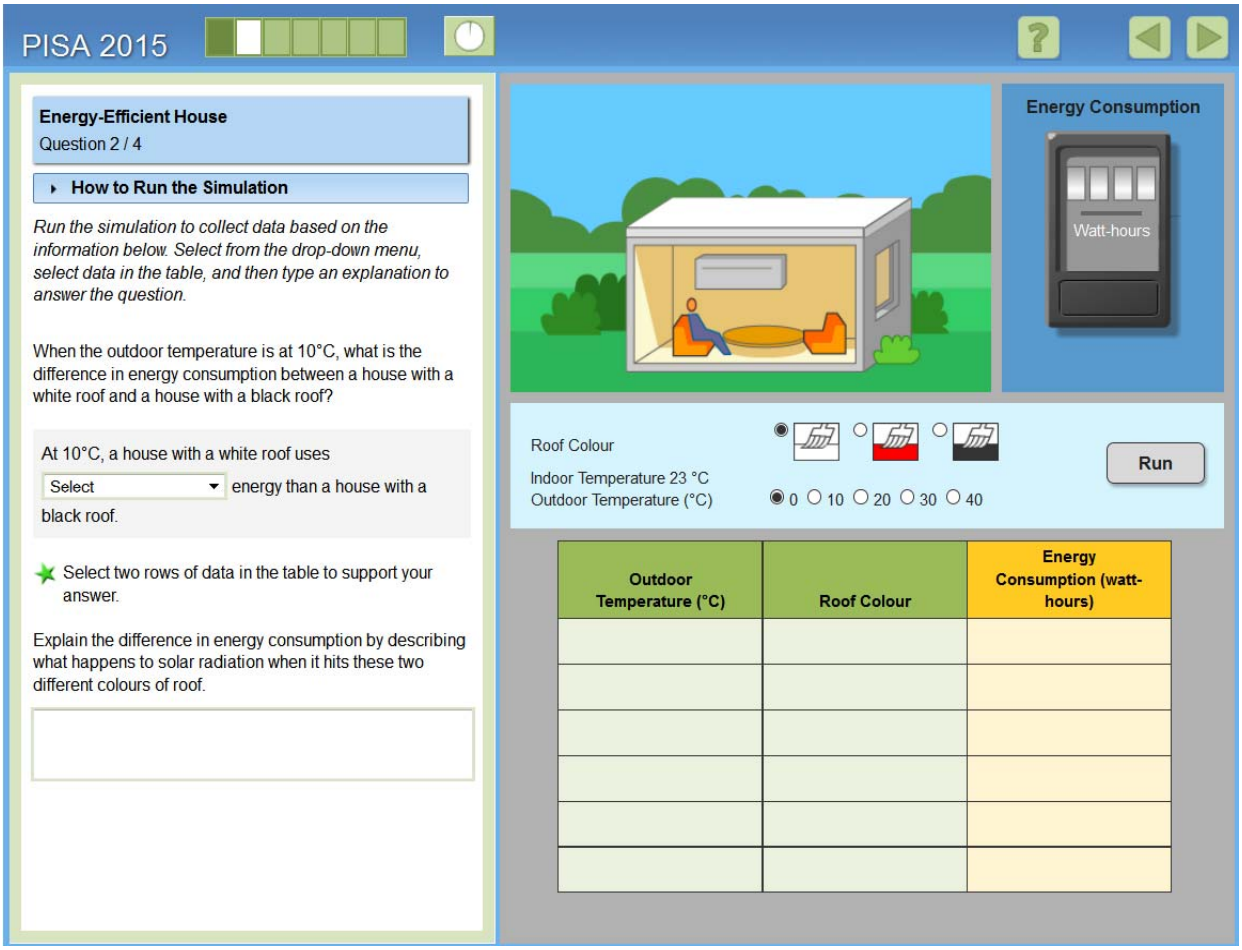
## Unit 633 *Energy-Efficient House*
## Released Item #1




Students are asked to select an outside temperature of 40°C and use the simulation results to put the roof colours in order from highest to lowest in terms of energy consumption as well as identify the data that support their selections. The correct response is: *black* (highest energy consumption at this temperature), *red* (middle), *white* (lowest) and the 3 supporting rows of data include ones with the outdoor temperature set to a constant 40°C and each of three roof colours selected (red, black and white).

| | |
|---|---|
| *Item Number* | CS633Q01 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Local/National – Natural Resources |
| *Cognitive Demand* | Low |
| *Item Format* | Open Response – Computer Scored |

## Unit 633 *Energy-Efficient House*
## Released Item #2

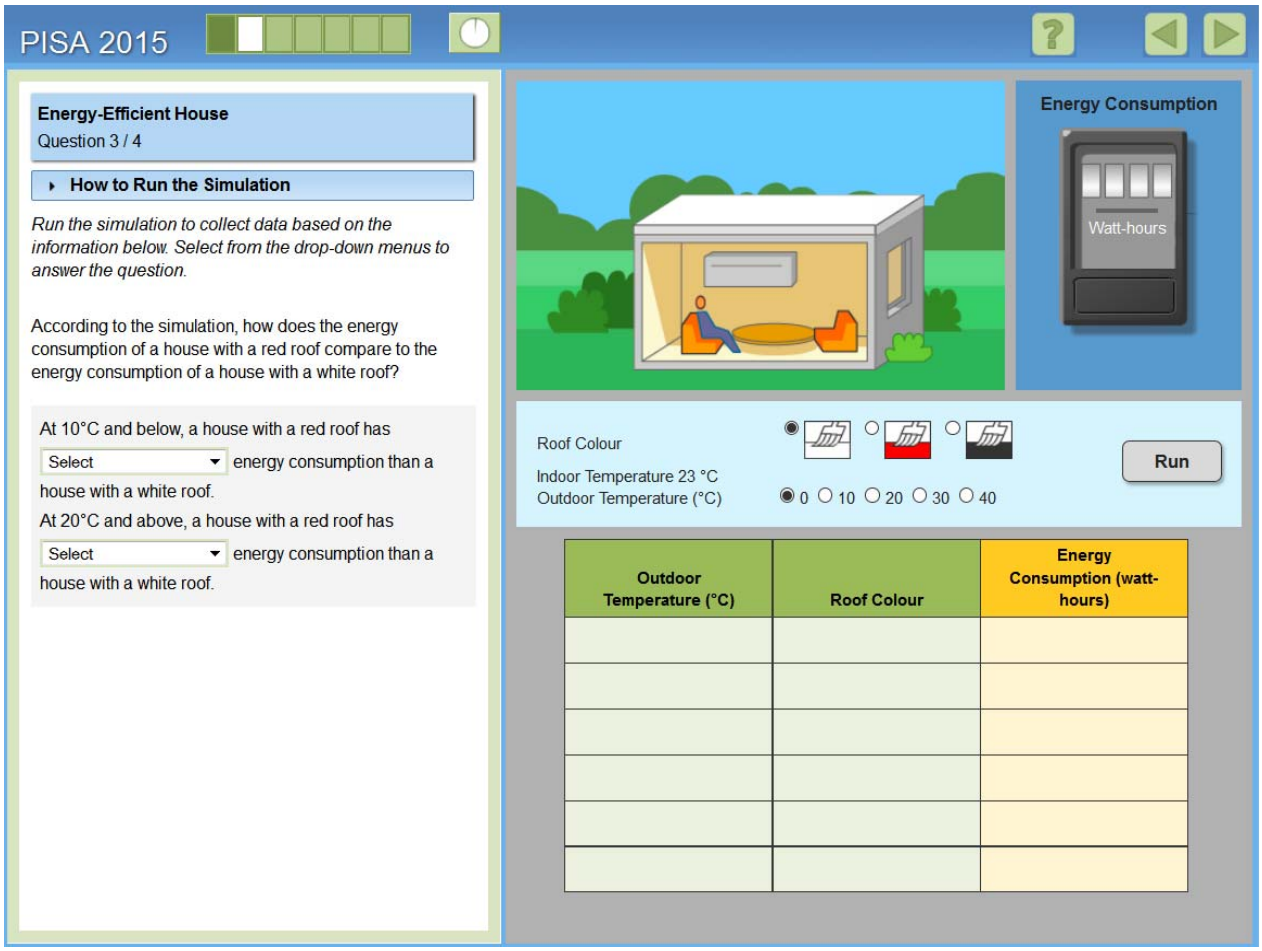



Students are asked to use the simulation to compare the energy consumption of a house with a white roof versus one with a black roof at at 10°C. This item includes two separate coded questions: CS633Q02 includes the multiple-choice question and the selection of data to support that answer; CS633Q03 asks students to explain the how roof colour affects the reflection and absorption of solar radiation.

CS633Q02 includes both a drop-down selection and data selection. The white roof uses *more* energy than the black roof to heat the house to 23°C when the outdoor temperature is 10°C. The supporting data include two rows with the outdoor temperature of 10°C – one with a white roof selected and the other with a black roof selected.
To explain this phenomenon in CS633Q03, students must indicate or imply that sunlight is a source of energy, or heat, and that the black roof absorbs more solar radiation than the white roof.

| | |
|---|---|
| *Item Number* | CS633Q02 and CS633Q03 |
| *Competency* | Q02: Interpret Data and Evidence Scientifically<br>Q03: Explain Phenomena Scientifically |
| *Knowledge – System* | Q02: Procedural<br>Q03: Content – Physical |
| *Context* | Local/National – Natural Resources |
| *Cognitive Demand* | Medium |
| *Item Format* | Q02: Open Response – Computer Scored<br>Q03: Open Response – Human Coded |

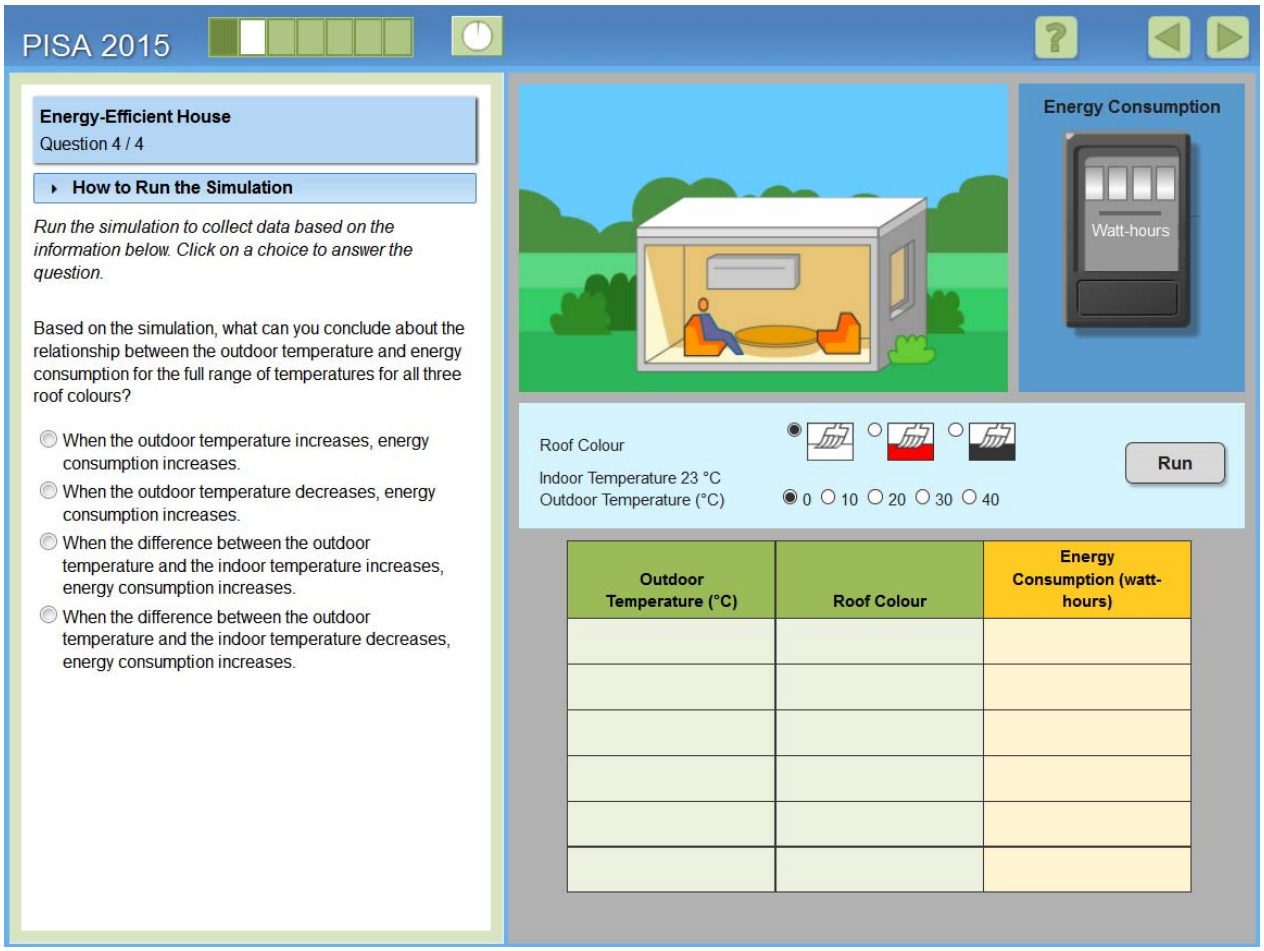
## Unit 633 *Energy-Efficient House*
## Released Item #3




Students are asked to run the simulation to compare the energy consumption of a house with a red roof versus one with a white roof first at 10°C and then at 20°C. Students should determine that a house with a red roof has *lower* energy consumption than one with a white roof at temperatures of 10°C or below, but *higher* energy consumption at temperatures of 20°C or above.

| | |
|---|---|
| *Item Number* | CS633Q04 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Procedural |
| *Context* | Local/National – Natural Resources |
| *Cognitive Demand* | Medium |
| *Item Format* | Complex Multiple Choice – Computer Scored |

## Unit 633 *Energy-Efficient House*
## Released Item #4




Students are asked to select a statement about the relationship between outdoor temperature and energy consumption that is supported by the simulation. The correct response is the third option: *When the difference between the outdoor temperature and the indoor temperature increases, energy consumption increases.*

| | |
|---|---|
| *Item Number* | CS633Q05 |
| *Competency* | Interpret Data and Evidence Scientifically |
| *Knowledge – System* | Content – Physical |
| *Context* | Local/National – Natural Resources |
| *Cognitive Demand* | High |
| *Item Format* | Simple Multiple Choice – Computer Scored |

## Collaborative Problem Solving – Overview

One Collaborative Problem Solving unit from the 2015 Field Trial was approved for release by the Collaborative Problem Solving Expert Group. This unit, The Visit, included 44 measurable student actions (or "items") and was completed by students during the Field Trial in a mean time of about 17 minutes. A total of six units were developed for the Field Trial and five were moved forward for inclusion in the 2015 Main Study.

As the innovative domain for PISA 2015, Collaborative Problem Solving (CPS) is defined in the draft framework as "the capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution and pooling their knowledge, skills and efforts to reach that solution." The framework identifies three core collaborative competences:

- Establishing and maintaining a shared understanding
- Taking appropriate action to solve the problem
- Establishing and maintaining team organisation

Additionally, the CPS construct includes core problem solving competencies including:

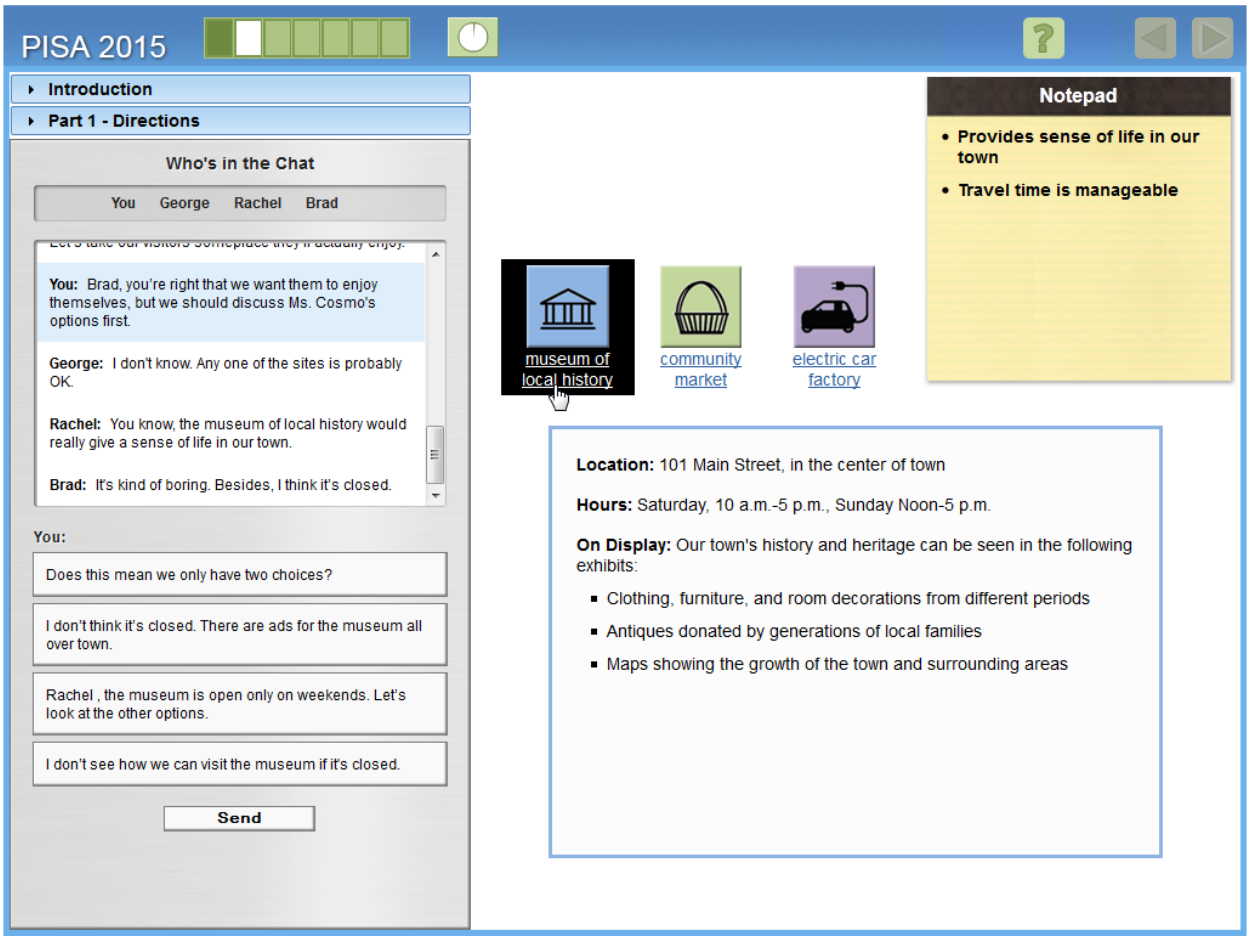
- Exploring and understanding
- Representing and formulating
- Planning and executing
- Monitoring and reflecting.

Taken together, these form a matrix of CPS competencies, as shown in the figure below. Across the CPS units, items were developed to fit all cells in that matrix.

| | **(1) Establishing and maintaining shared understanding** | **(2) Taking appropriate action to solve the problem** | **(3) Establishing and maintaining team organisation** |
|---|---|---|---|
| **(A) Exploring and Understanding** | (A1) Discovering perspectives and abilities of team members | (A2) Discovering the type of collaborative interaction required and establishing goals | (A3) Understanding roles to solve problem |
| **(B) Representing and Formulating** | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) | (B2) Identifying and describing tasks to be completed | (B3) Describing roles and team organisation (communication protocol/rules of engagement) |
| **(C) Planning and Executing** | (C1) Communicating with team members about the actions performed | (C2) Enacting plans | (C3) Following rules of engagement |
| **(D) Monitoring and Reflecting** | (D1) Monitoring and repairing the shared understanding | (D2) Monitoring results of actions and evaluating success in solving the problem | (D3) Monitoring, providing feedback and adapting the team organisation and roles |

The CPS units include chat-based tasks where students interact with one or more agents, or simulated team members, to solve a presented problem. Students are presented with a set of chat options and are asked to select the most appropriate choice. Once selected, the choice displays in the chat history area, and then responses from one or more agents follow. Students can scroll through the history to review chat as needed. Responses from agents are based on student selections. As a result, there are multiple paths through each unit. To ensure that any incorrect or non-optimal selections will not penalise students as they progress through the task, each unit is designed with convergence, or rescue, points. At these points, one of the agents provides necessary information or helps advance the collaborative problem solving process so that students can continue to progress through the task.

In addition to the chat interactions, the CPS units include a task area on the right side of the screen where students can take actions, view notes recorded by agents, or keep track of progress through the task. In the sample screen from part 1 of The Visit shown below, the task area includes clickable links to three websites with information that is needed to solve the problem that has been assigned to the team as well as a notepad where key information is recorded by teammates.




Chat Space

Task Space

## Format for this Released Unit

Because there are multiple paths through CPS units it is not possible to provide screen shots for each screen in the unit in a clearly understandable way. The screen shots provided show the optimal path through each part of the unit. Descriptions are provided for all alternate paths and their associated items.

For each item, the following information is provided:

| | |
|---|---|
| *Item Number* | |
| *Credited Response* | |
| *Classification* | |

Item Number: Each number includes the designation used for CPS (CC), the unit number (101), the part designation (1, 2 or 3) followed by a two-digit item ID.

Credited response: Each credited response, or responses, is listed. For each chat-based item, the correct response can also be indentified in the screen shot by the blue highlighting that displays on screen when students select an option. Where more than one response is credited, that is noted in the descriptive text.

Classification: The framework classification for each item is also listed. A letter/number combination references the CPS competencies matrix, as shown on page 47.

## *The Visit*
## Unit Overview

The premise for this unit is that a group of international students is coming to visit a school. The student must collaborate with 3 agent teammates and a faculty advisor to plan the visit, assign visitors to guides, and respond to an unexpected problem that arises.

### Part 1: Overview

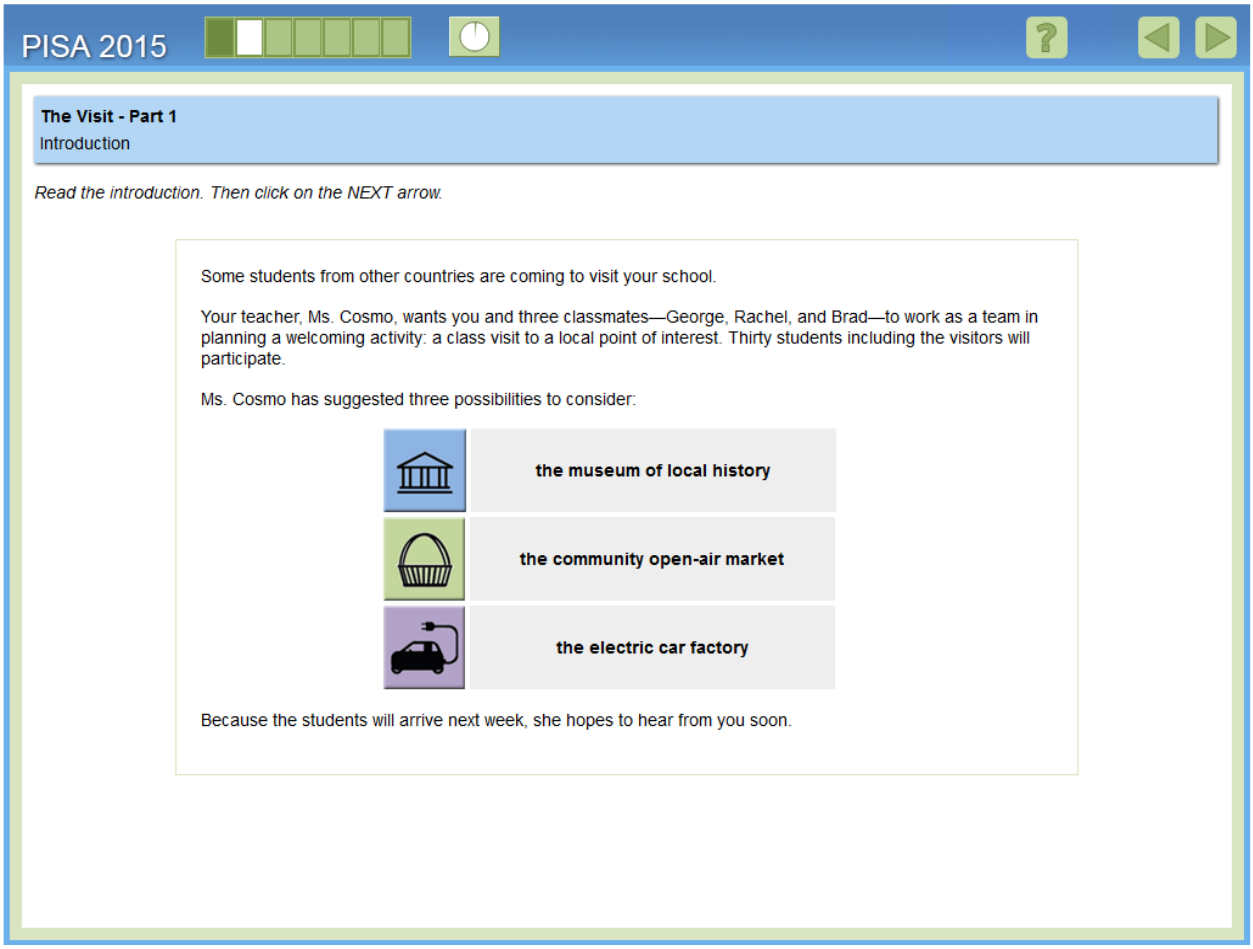
In Part 1of The Visit, the student and three teammates collaborate to identify an appropriate trip to a local point of interest for the visitors. In order to make their recommendation, the team needs to share and discuss their preferences, repair a misunderstanding about when one of the sites is open, and make a final selection.

Challenges requiring collaborative skills include the need for the student to:

- solicit and take into account criteria for assessing the outing options
- clarify statements made by other teammates
- correct misinformation and avoid an impasse
- prompt team members to perform their tasks
- ensure that the final recommendation meets all specified criteria

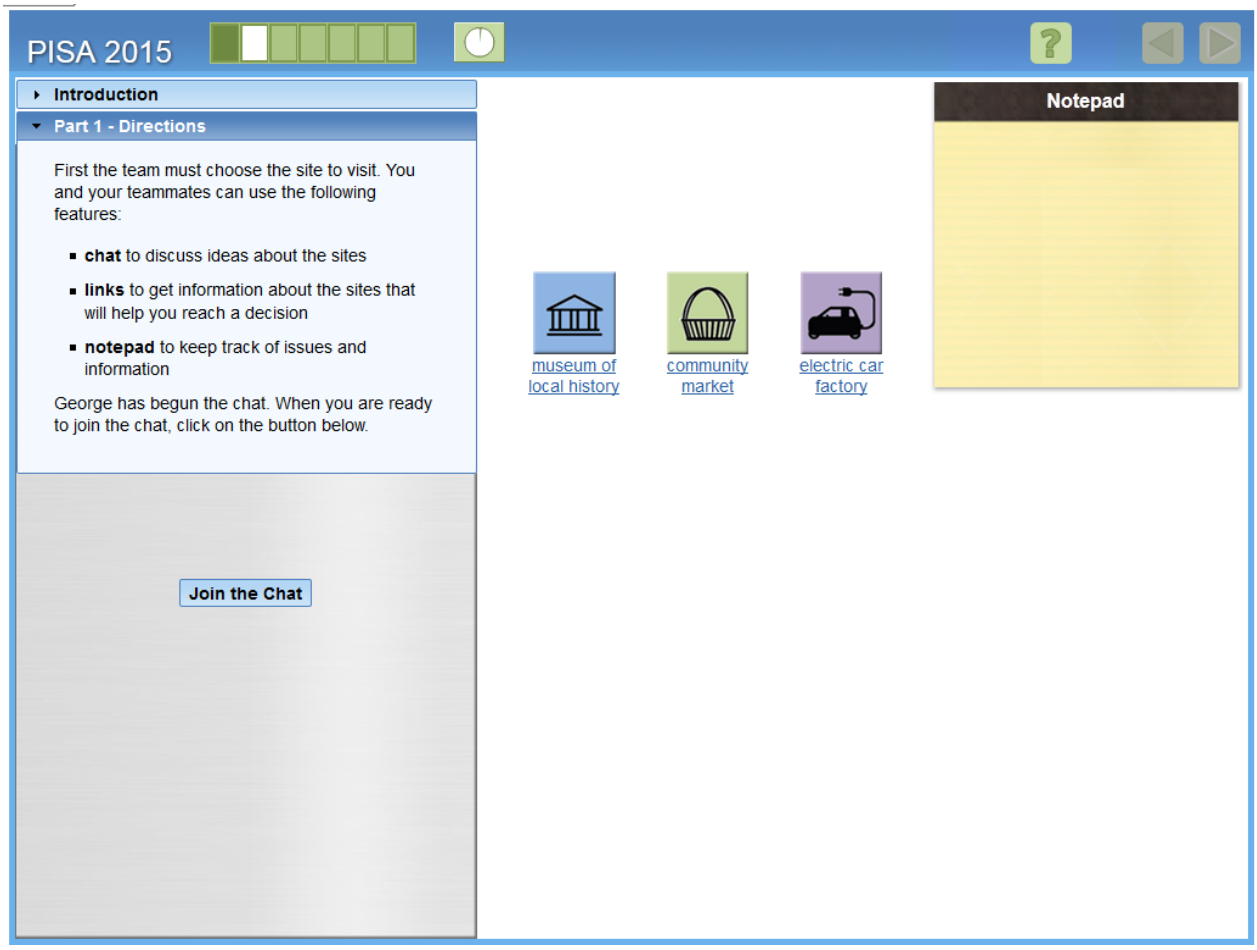
### Part 1 Introduction

The opening screen provides an overview for students. The goal for Part 1 is defined and students learn that there are three potential sites to be considered for the trip.

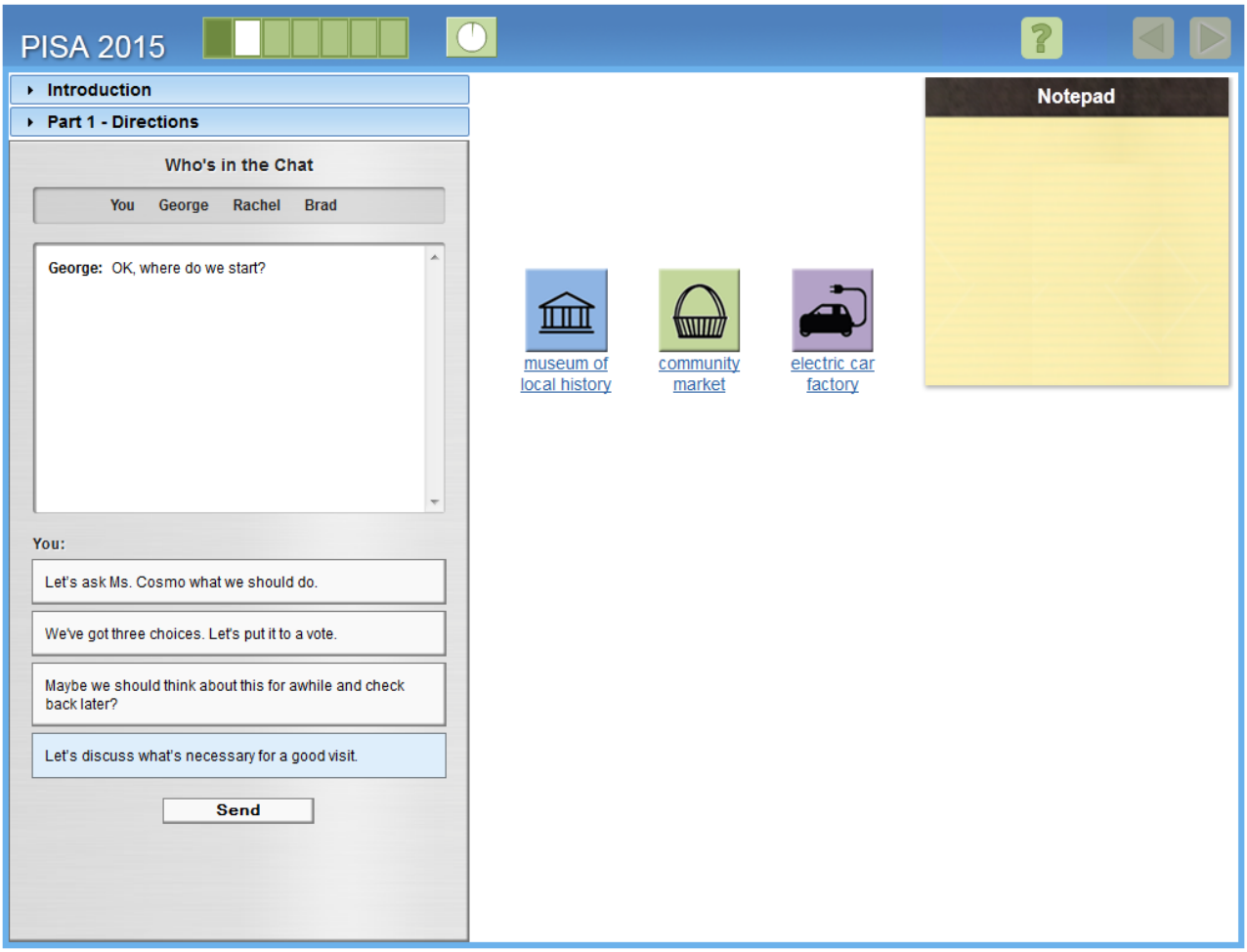


## Part 1 Directions

Directions for the task are presented on the left side of the screen, as shown below. The task pane on the right includes a notepad, where key points from the chat will display, and links to the three local sites under consideration. Clicking on a link displays a brief list of relevant information for each site (location, hours of operation, tour information, and what visitors can see there).



## Part 1 – Sample Screen #1



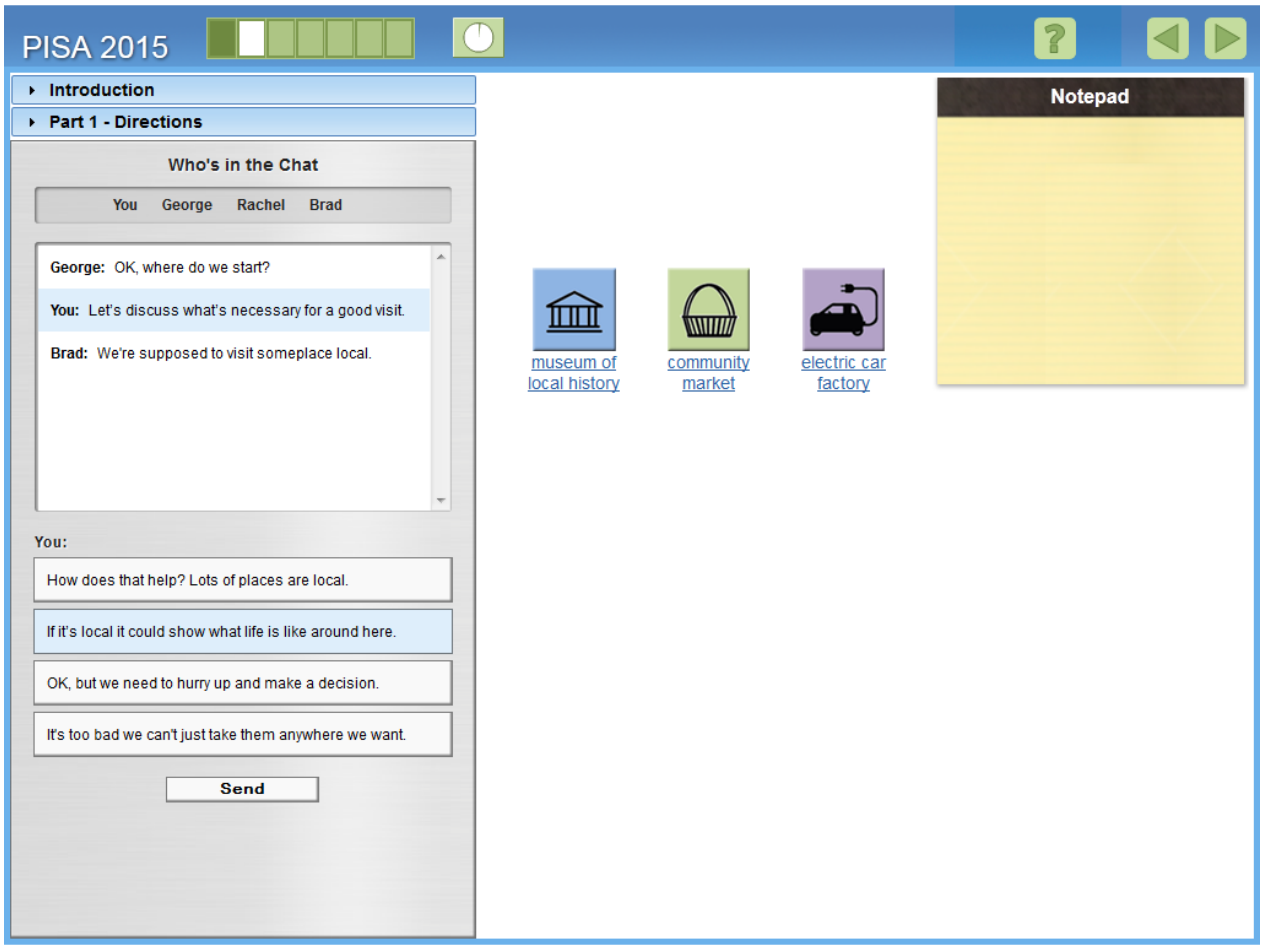

| | |
|---|---|
| *Item* | CC101101 |
| *Credited Response* | Let's discuss what's necessary for a good visit. |
| *Classification* | (B2) Identifying and describing tasks to be completed |

The student must select from among four chat choices to respond to George's open-ended question about where to begin. The first and third options are not credited because they are both attempts to avoid taking action. While the second option ("We've got three choices. Let's put it to a vote") might sound collaborative, it does not really help the team solve the presented problem as they do not yet have enough information to select a site. Therefore this option is not credited as correct.

If the student does not select the credited response, Rachel rescues by saying "We need to make a decision soon. Let's talk about what a visit site should be like."

## Part 1 – Sample Screen #2

Brad mentions that the group is supposed to visit someplace local.



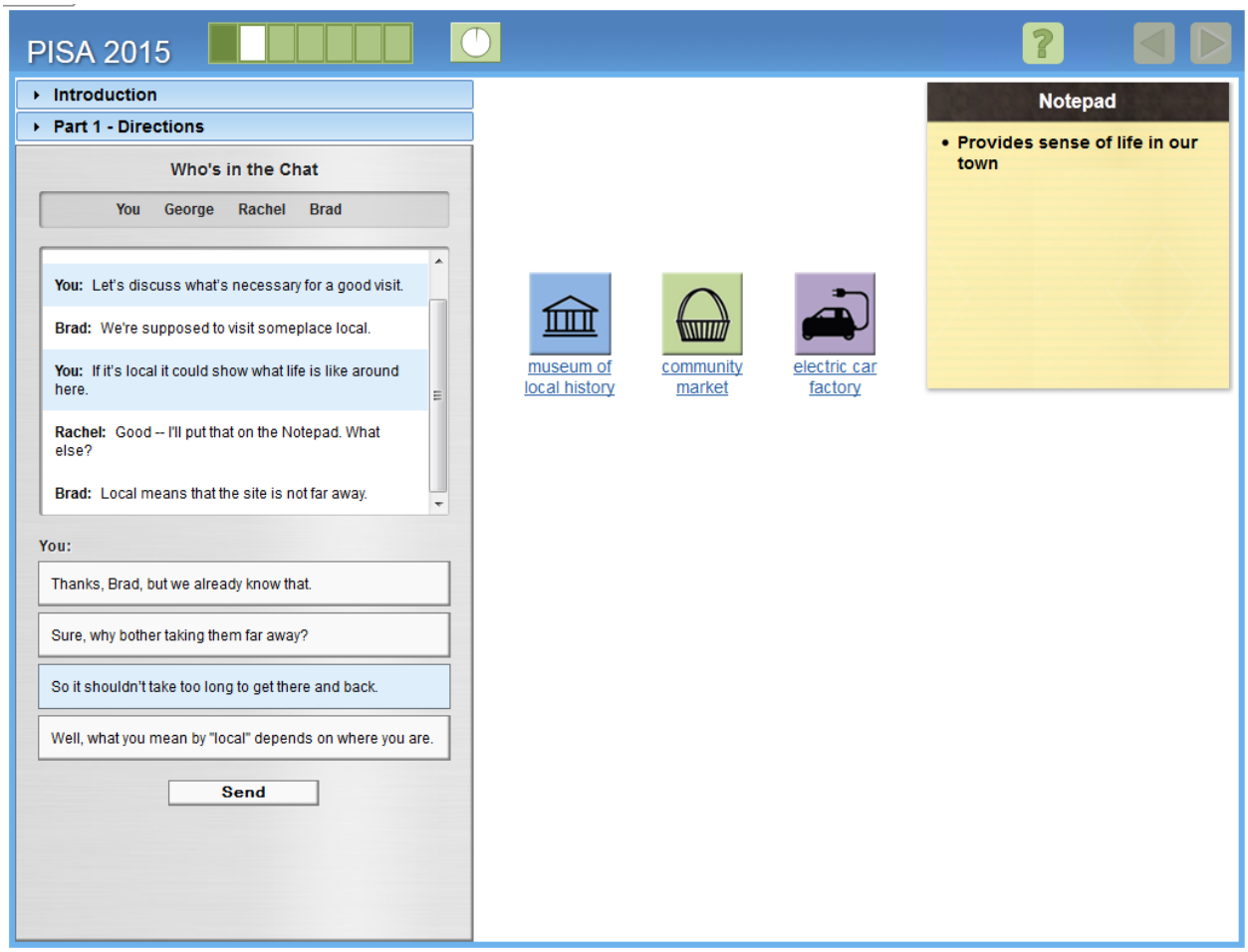

| | |
|---|---|
| *Item* | CC101102 |
| *Credited Response* | If it's local it could show what life is like around here. |
| *Classification* | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) |

The second response is credited because it is the only one of the four that helps advance the group's shared understanding of what "local" might mean.

If the student does not select the credited response, George rescues by saying, "So maybe it should give a sense of what our town is like."

## Part 1 – Sample Screen #3

Rachel adds a note to the notepad confirming that the site should "provide sense of life in our town." Brad comments that, "Local means that the site is not far away."

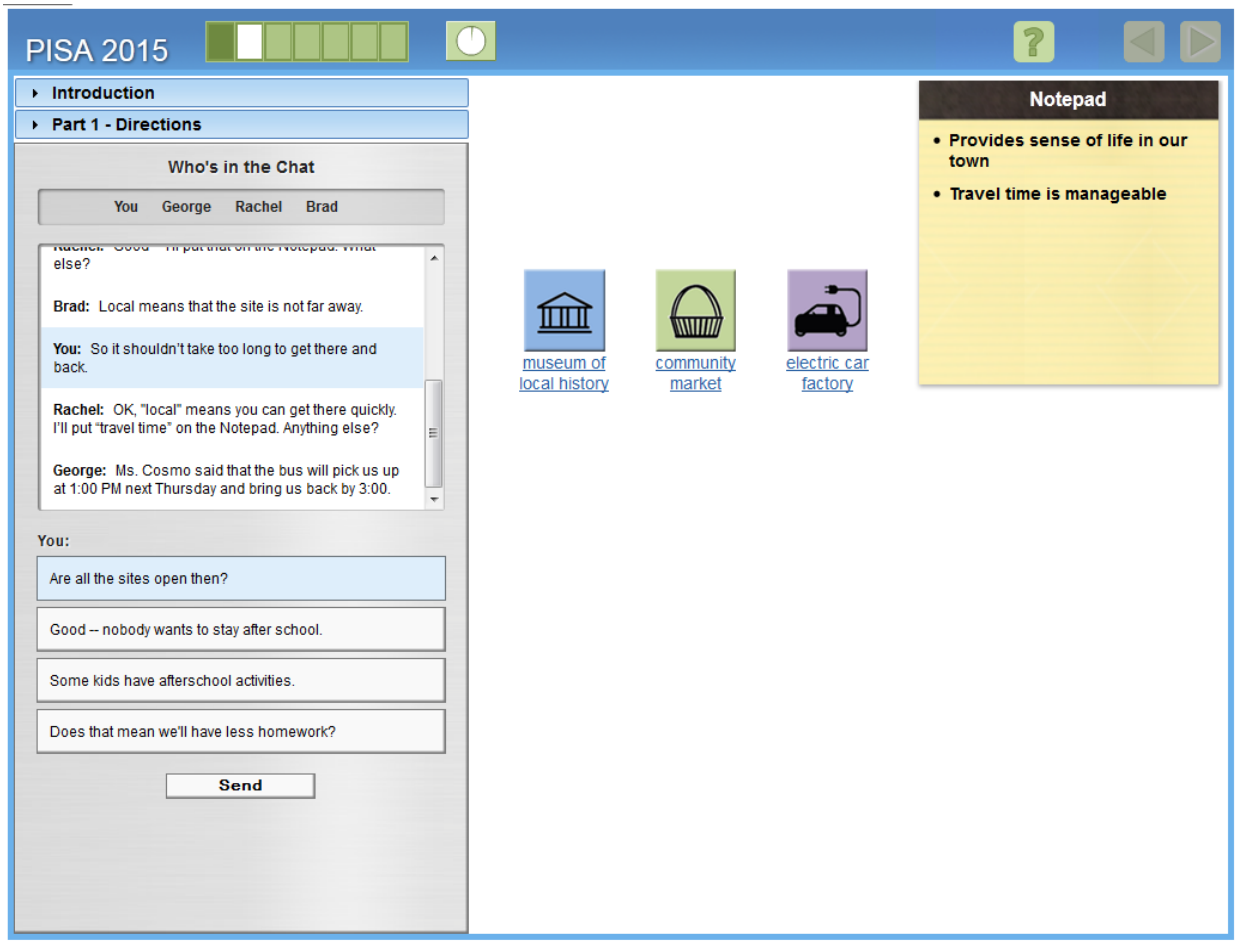



| | |
|---|---|
| *Item* | CC101103 |
| *Credited Response* | So it shouldn't take too long to get there and back. |
| *Classification* | (C1) Communicating with team members about the actions performed |

The credited response helps advance the shared understanding by clarifying one criterion the selected site must meet.

## Part 1 – Sample Screen #4

Regardless of the student response for the previous item, Rachel makes an entry on the notepad and answers by saying, "OK, 'local' means you can get there quickly. I'll put 'travel time' on the Notepad. Anything else?"
George responds by bringing up the schedule that must be met. "Ms. Cosmo said that the bus will pick us up at 1:00 PM next Thursday and bring us back by 3:00."

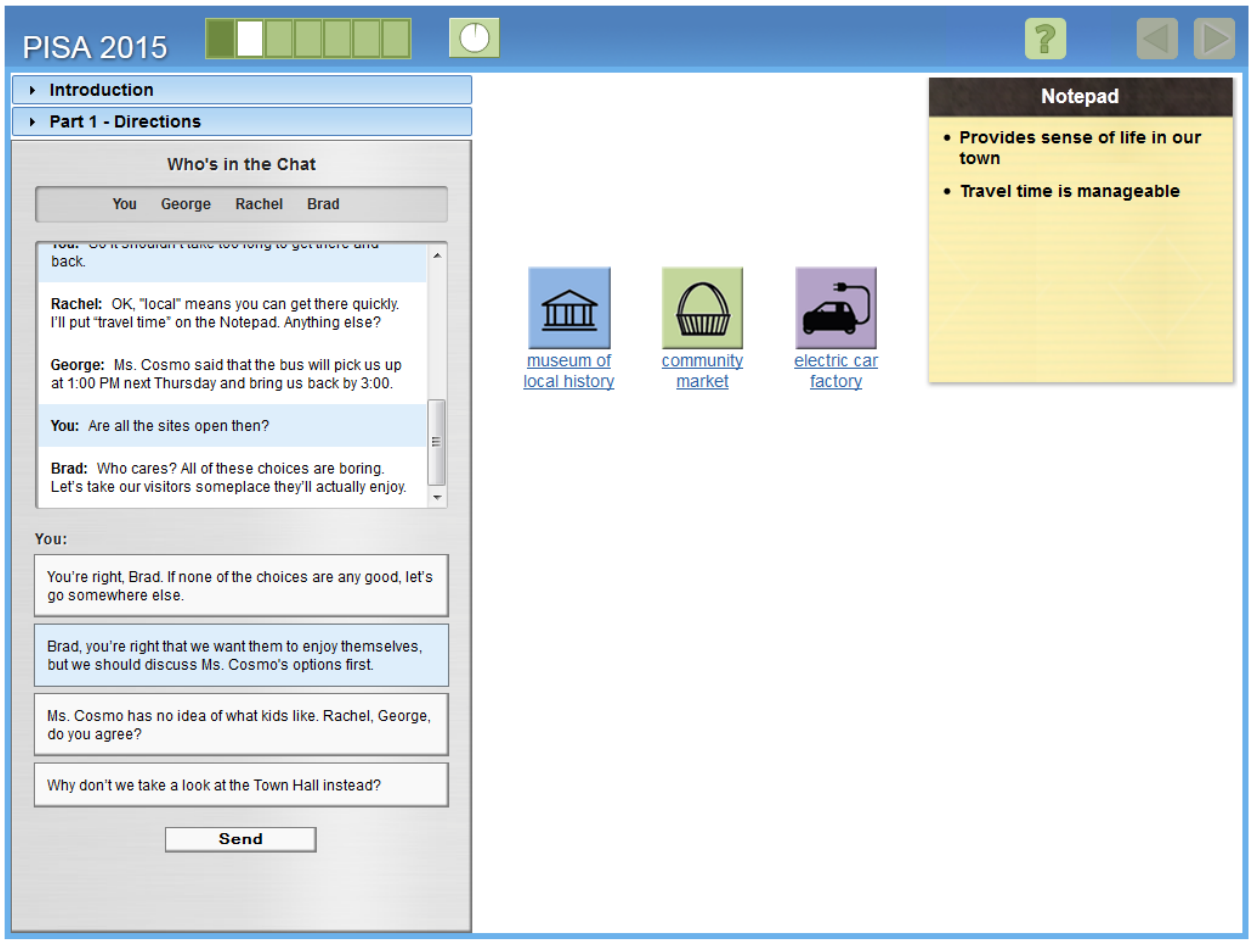



| | |
|---|---|
| *Item* | CC101104 |
| *Credited Response* | Are all the sites open then? |
| *Classification* | (C3) Following rules of engagement, (e.g., prompting other team members to perform their tasks) |

In this case, the credited response helps move the problem solving process forward, pointing out to the team that they need to be sure the selected site meets the schedule defined by Ms. Cosmo.

## Part 1 – Sample Screen #5

Any selection made by the student is followed by a comment from Brad. He goes off task a bit, saying, "Who cares? All of these choices are boring. Let's take our visitors someplace they'll actually enjoy."

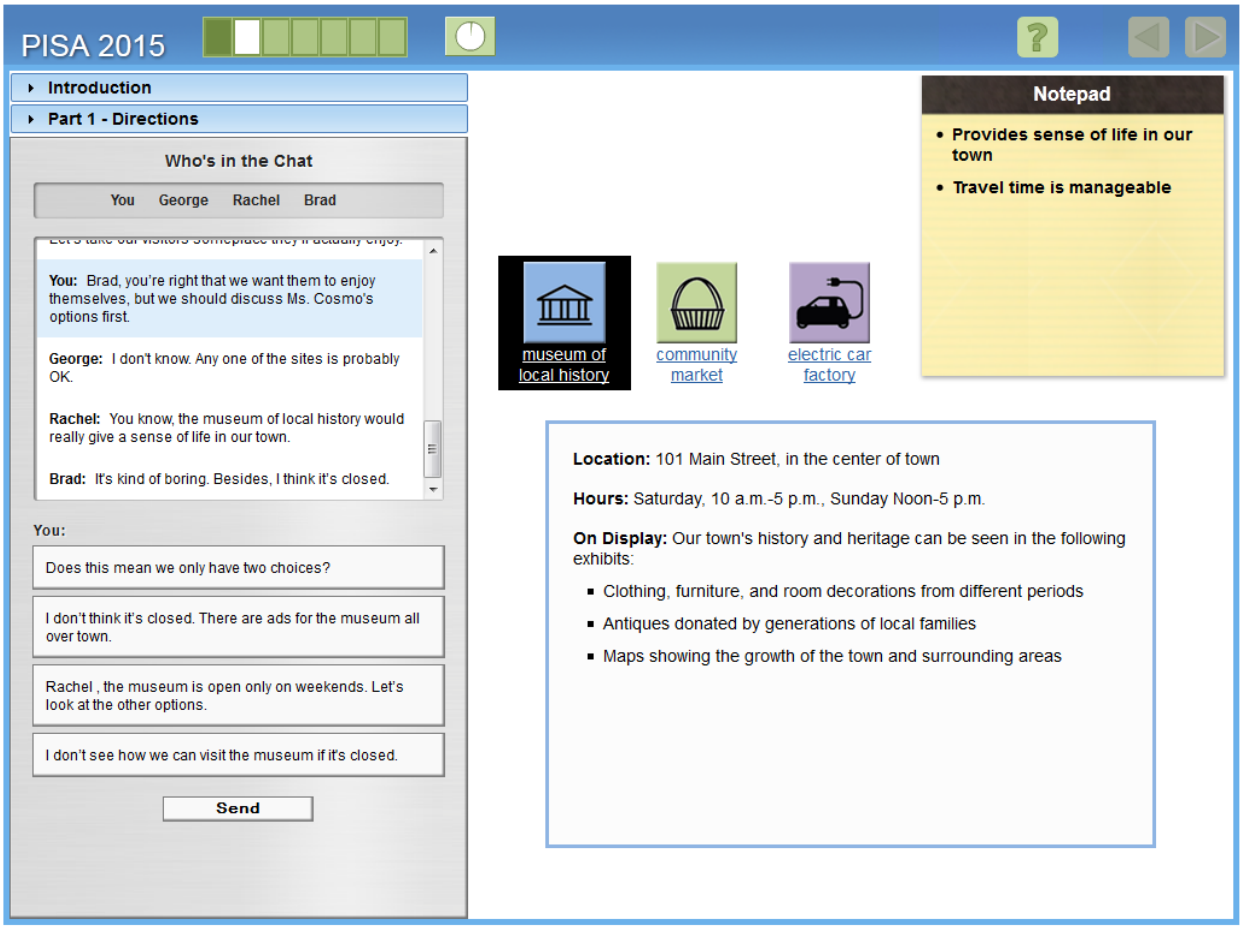



| | |
|---|---|
| *Item* | CC101105 |
| *Credited Response* | Brad, you're right that we want them to enjoy themselves, but we should discuss Ms. Cosmo's options first. |
| *Classification* | (D1) Monitoring, providing feedback and adapting the team organisation and roles |

The credited response acknowledges Brad's statement while reminding him about the team's task, providing feedback to keep the discussion focused.

## Part 1 – Sample Screen #6

Each team member expresses an opinion about the site selection. George states that any site is probably ok, Rachel suggests the museum of local history, and Brad says the museum is boring and that he thinks it is closed.

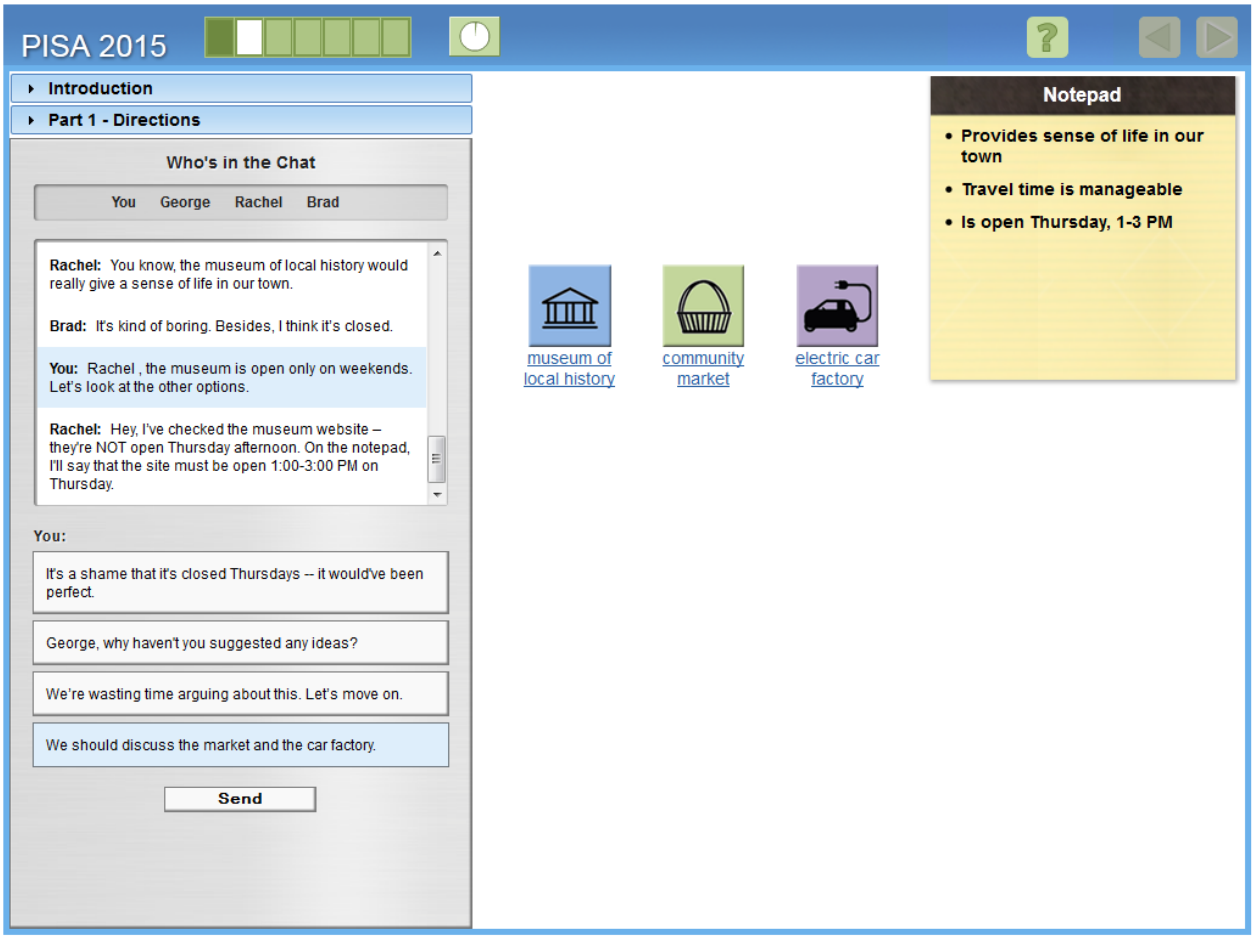



| | |
|---|---|
| *Item* | CC101106 |
| *Credited Response* | The student must click on the museum website, as shown above, in order to receive either full or partial credit.<br>Full credit response: Rachel , the museum is open only on weekends. Let's look at the other options<br>Partial credit response: I don't see how we can visit the museum if it's closed. |
| *Classification* | (C1) Communicating with team members about the actions performed |

For this item, the student must use the simulated web link in the task area to check when the museum is open and then choose the response that communicates the implications of that information to the team. Therefore, to gain full credit, the student must respond to Rachel's proposal and Brad's misinformation, clarifying that the museum is not open on the day scheduled for the class visit.

## Part 1 – Sample Screen #7

Rachel confirms that the museum is not open on Thursday afternoon (rescuing any students who do not answer the previous item correctly). She adds a note to the notepad that the selected site must be open on Thursdays from 1-3 pm.

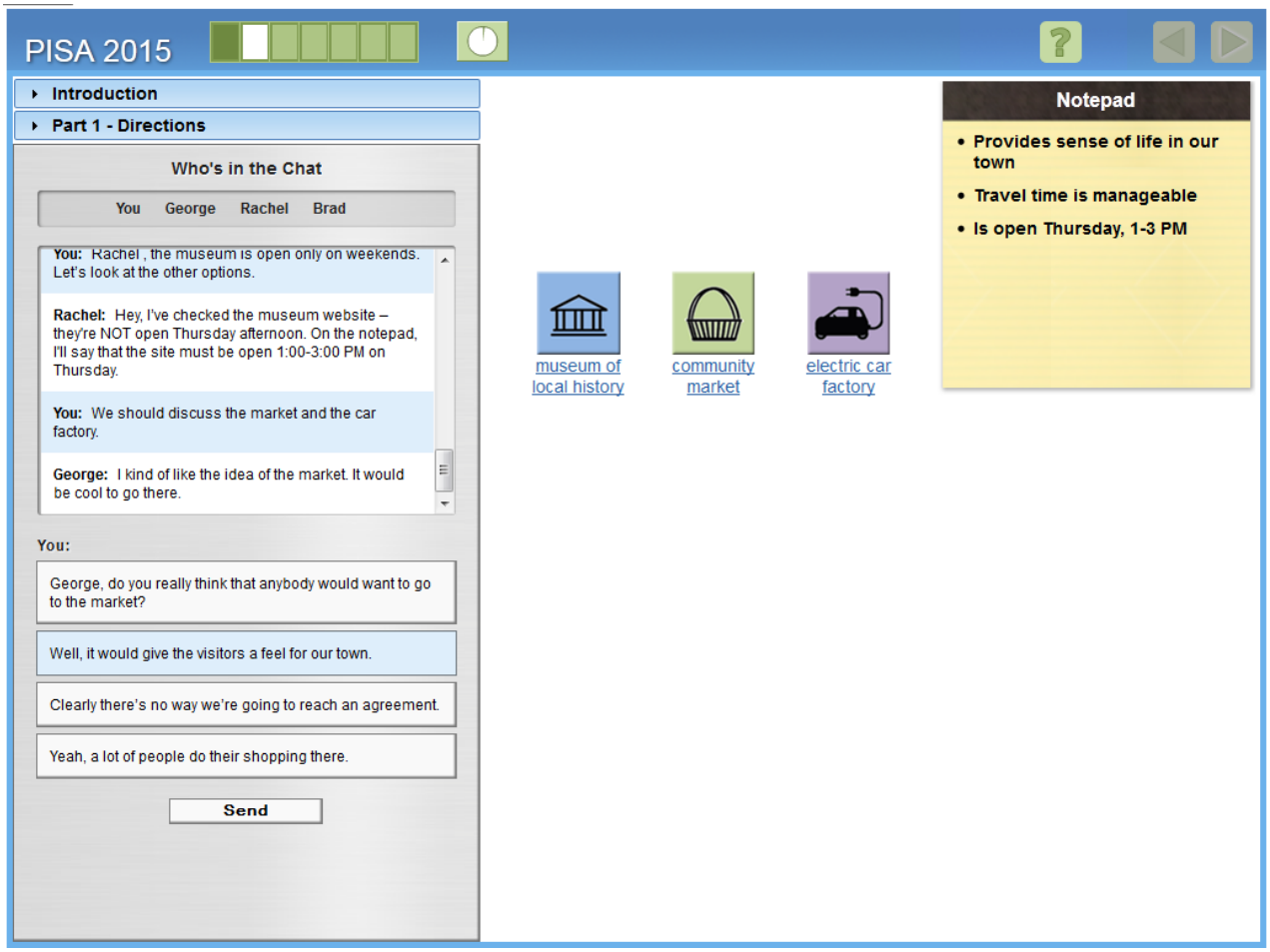



| | |
|---|---|
| *Item* | CC101107 |
| *Credited Response* | We should discuss the market and the car factory. |
| *Classification* | (C1) Communicating with team members about the actions to be/ being performed |

The credited response reminds team members that they have two additional choices to consider, given that the museum is not open on the required day.

## Part 1 – Sample Screen #8

Regardless of the student selection for the previous item, George states that he likes the idea of going to the market.

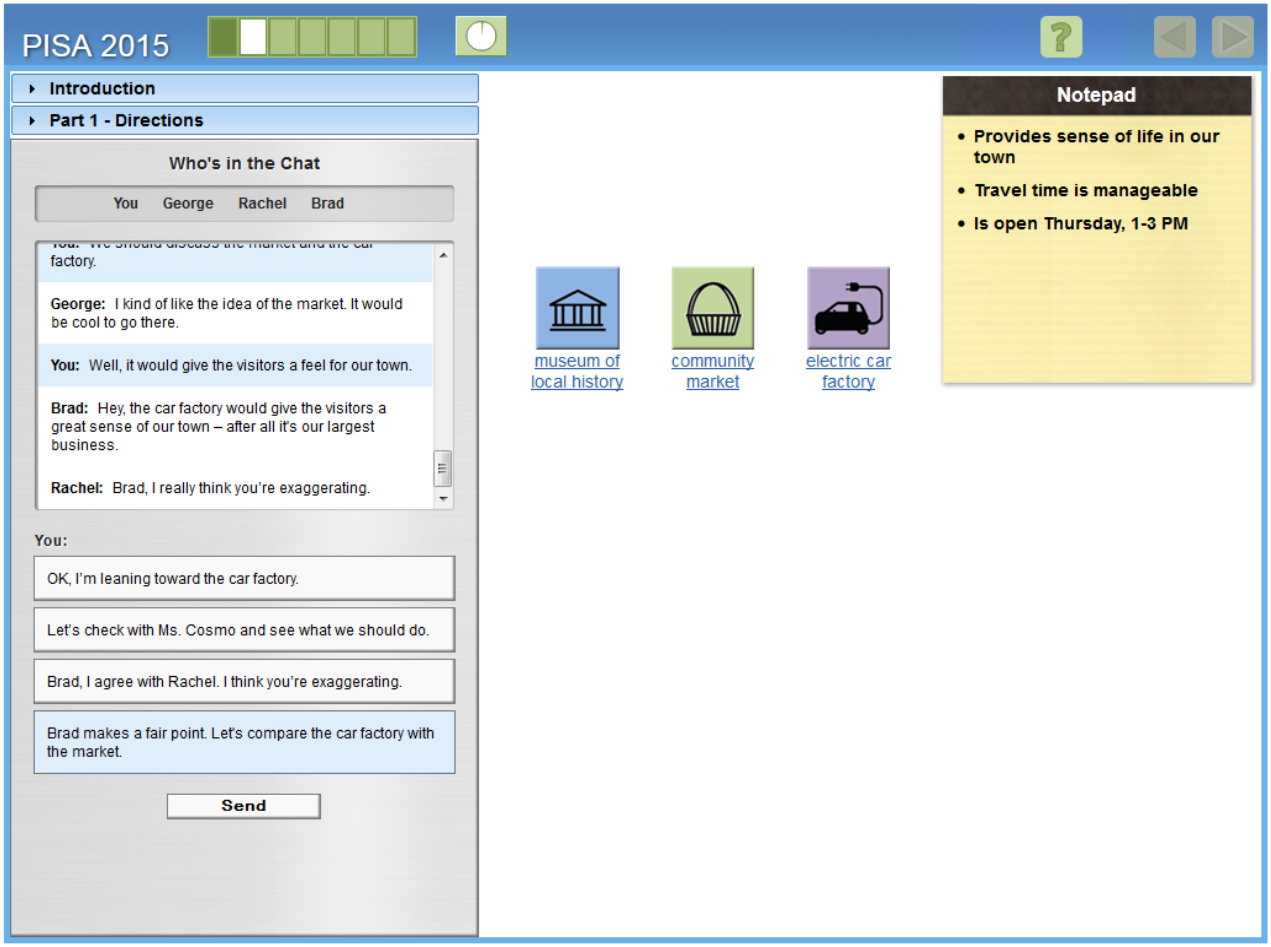



| | |
|---|---|
| *Item* | CC101108 |
| *Credited Response* | Well, it would give the visitors a feel for our town. |
| *Classification* | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) |

The credited response acknowledges that George's suggestion meets one of the specified criteria.

## Part 1 – Sample Screen #9

Brad proposes the car factory, saying it, too, would give the visitors a great sense of the town – although Rachel disagrees with his statement that it is the town's largest business.

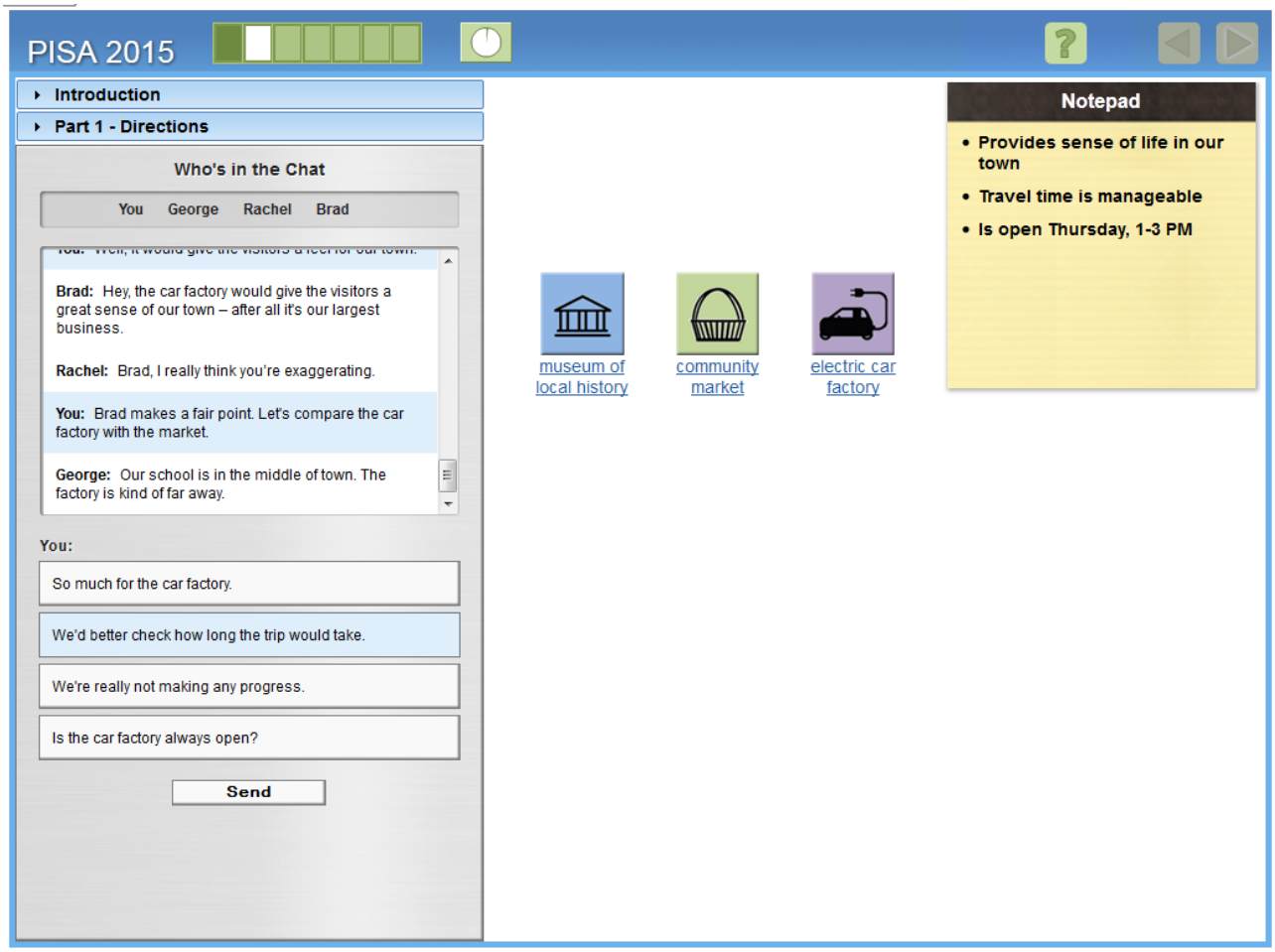



| | |
|---|---|
| *Item* | CC101109 |
| *Credited Response* | Brad makes a fair point. How does the car factory compare with the market? |
| *Classification* | (C3) Following rules of engagement |

The credited response supports Brad's suggestion, promoting group collaboration, and moves the team forward by prompting the team to compare the remaining options.

## Part 1 – Sample Screen #10

George raises a new consideration, noting that the factory is not located near the school.

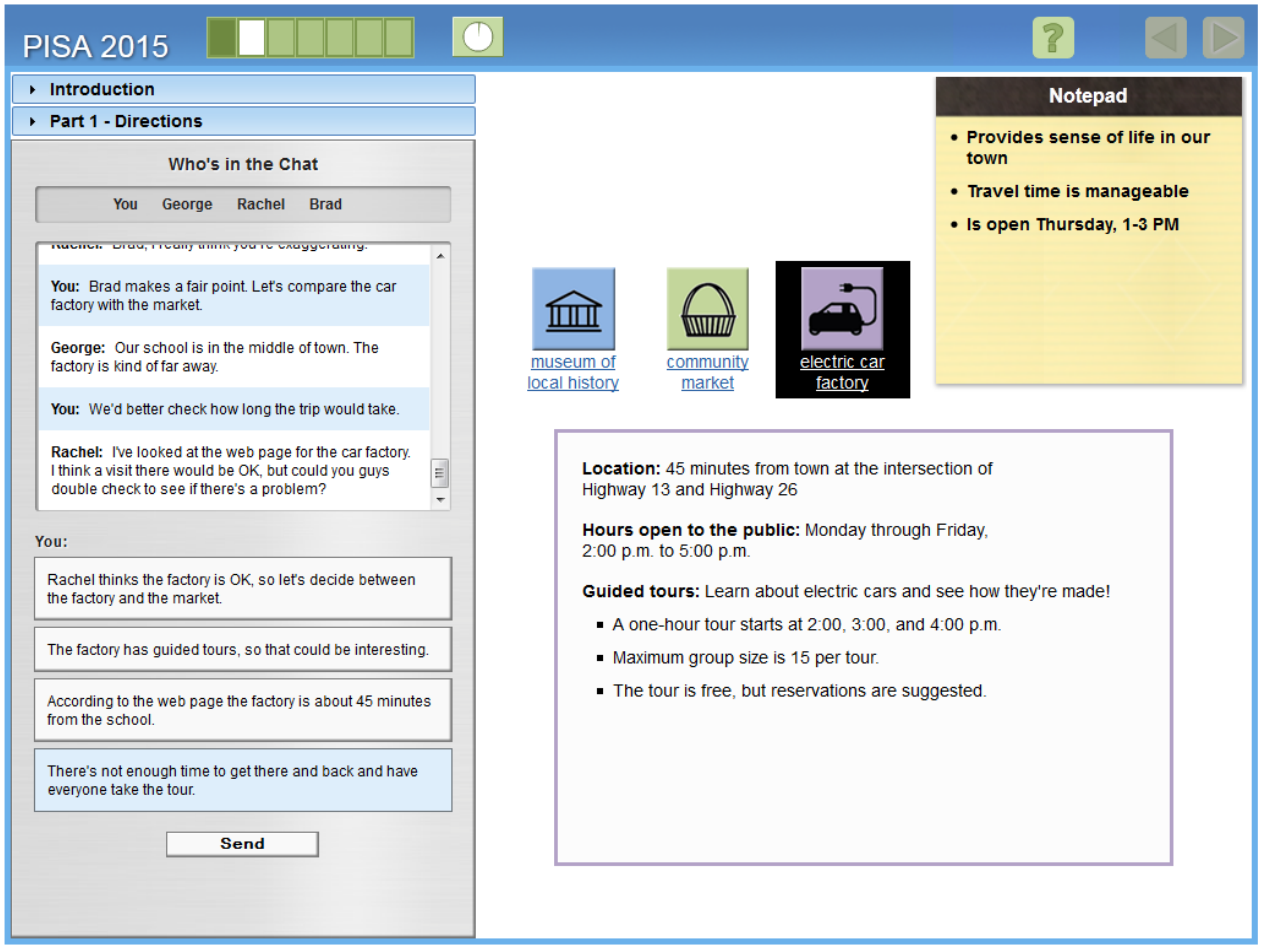



| | |
|---|---|
| *Item* | CC101110 |
| *Credited Response* | We'd better check how long the trip would take. |
| *Classification* | (C1) Communicating with team members about the actions performed |

The credited response communicates that George's point requires further investigation, keeping the team on task.

## Part 1 – Sample Screen #11

Rachel says that she has checked the car factory website and thinks it would be ok, but asks the team to double check.

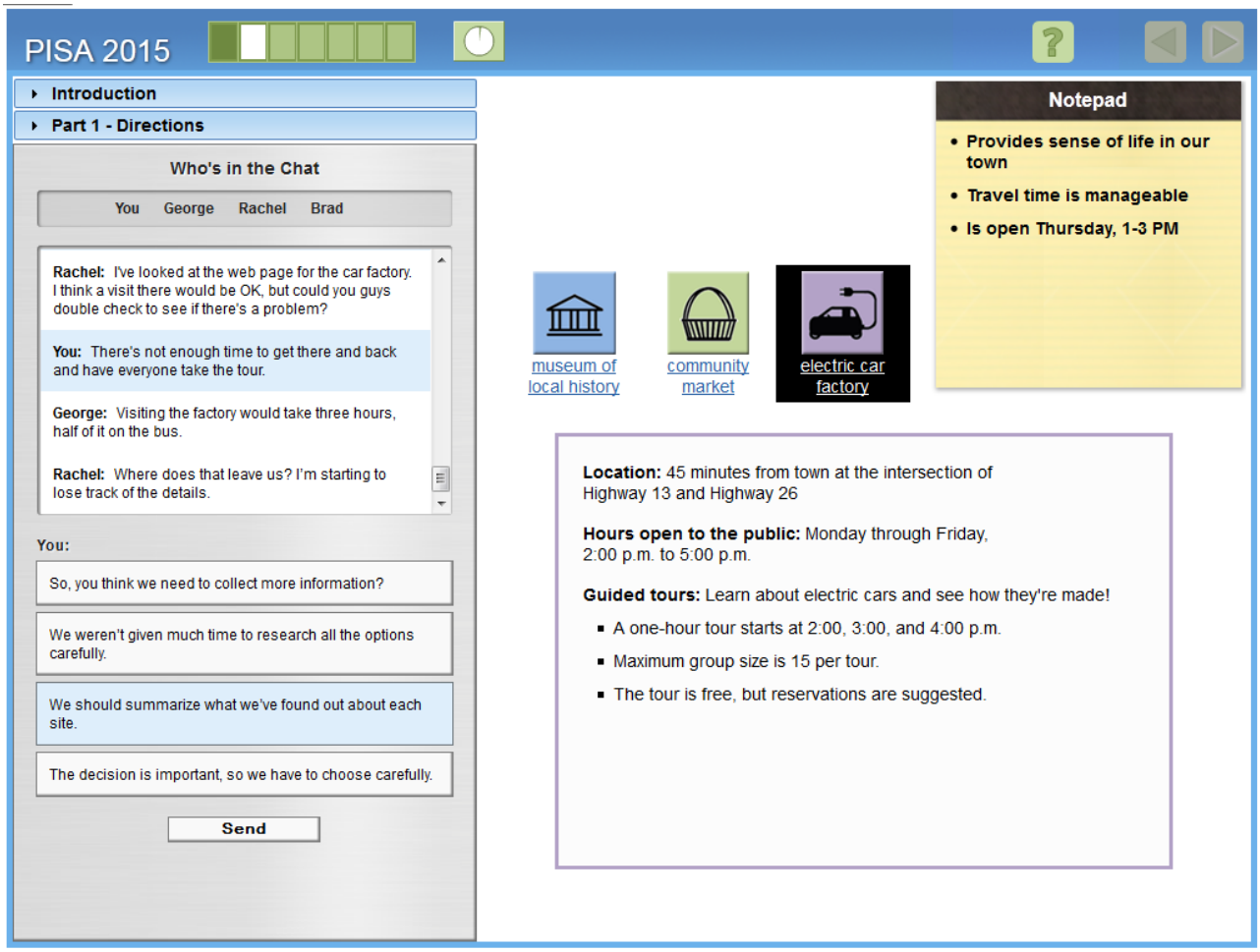



| | |
|---|---|
| *Item* | CC101111 |
| *Credited Response* | Student must must click on car factory website in order to receive credit for this response:<br>There's not enough time to get there and back and have everyone take the tour. |
| *Classification* | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) |

The credited response recognises that the thirty visitors will need to be divided into two tour groups (since the maximum size of a tour group at the factory is 15) This implies that there will have to be two consecutive tours. The need to have two tours, combined with the bus schedule means that the factory fails to meet the constraints set by Ms. Cosmo.

## Part 1 – Sample Screen #12

George provides the needed information about the time required for a visit to the car factory. Rachel expresses that she is losing track of the details that have been discussed to this point.

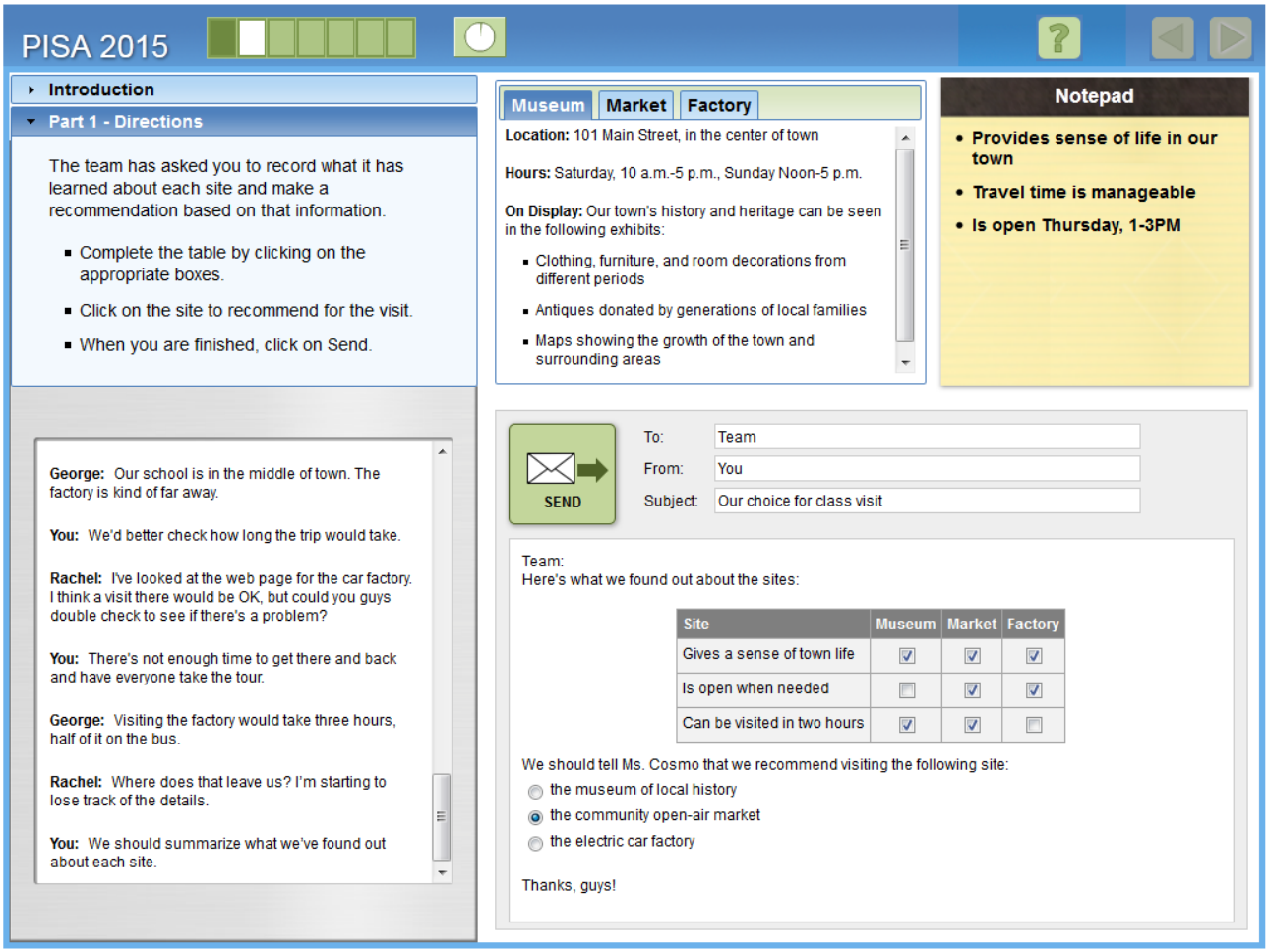



| | |
|---|---|
| *Item* | CC101112 |
| *Credited Response* | We should summarize what we've found out about each site. |
| *Classification* | (C2) Enacting plans<br>(C3) Following rules of engagement |

The credited response focuses on summarising the team's discussion to reach a final choice.

## Part 1 – Sample Screen #13

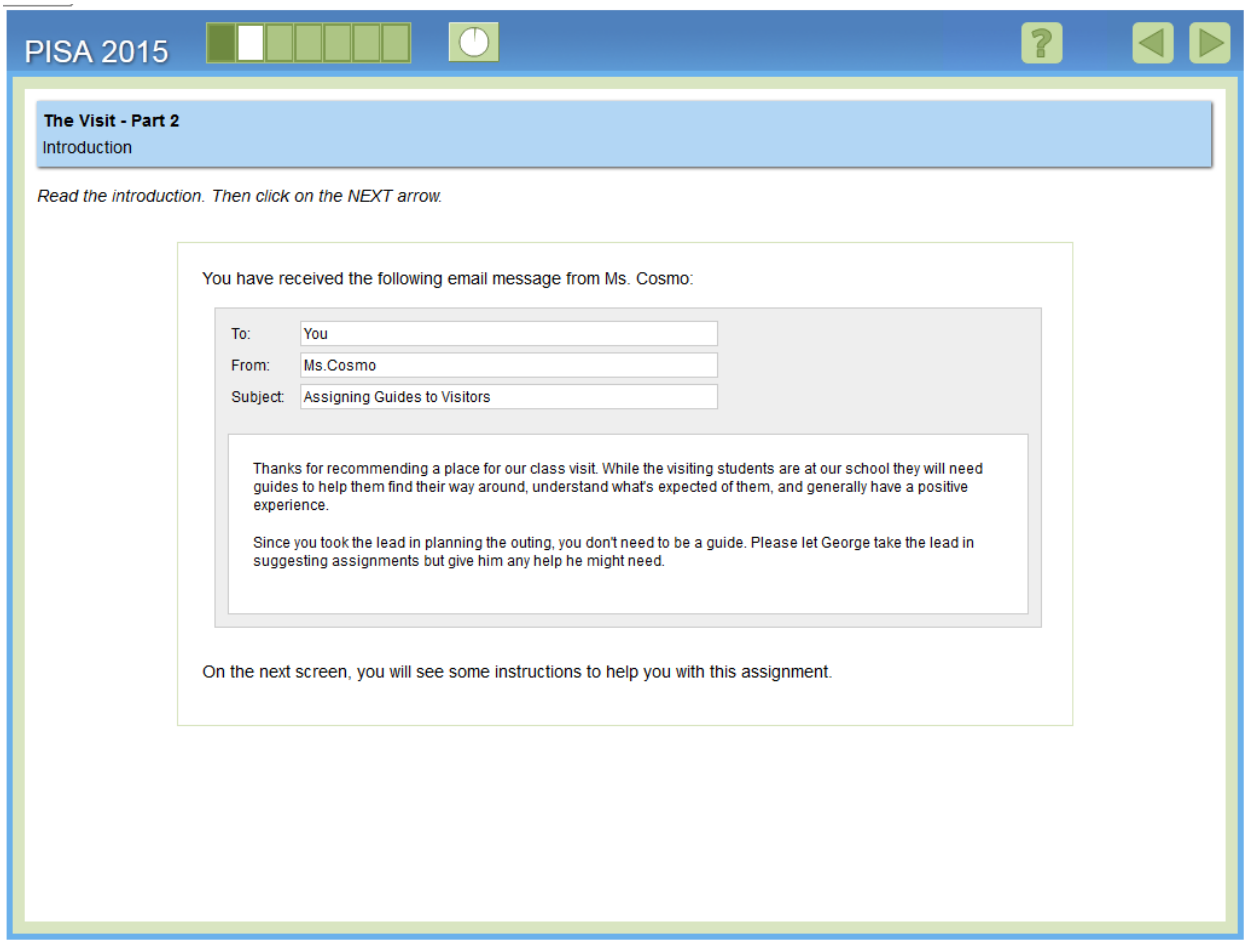
The student is tasked with summarising what the team has learned about the sites and making a recommendation. The chat history is available to review as is the information from the website for the museum, market and car factory.




| | |
|---|---|
| *Item* | CC101113 |
| *Credited Response* | On the table: all 3 boxes checked for the Market and 5 of the 6 buttons correctly checked for the Factory and Museum<br>Radio buttons: Community open-air market selected |
| *Classification* | (C2) Enacting plans<br>(C3) Following rules of engagement |

## Part 2: Overview

The opening screen of Part 2 presents an email from the faculty advisor, Ms. Cosmo. She presents an overview of the task and defines the key roles.



## Part 2: Directions

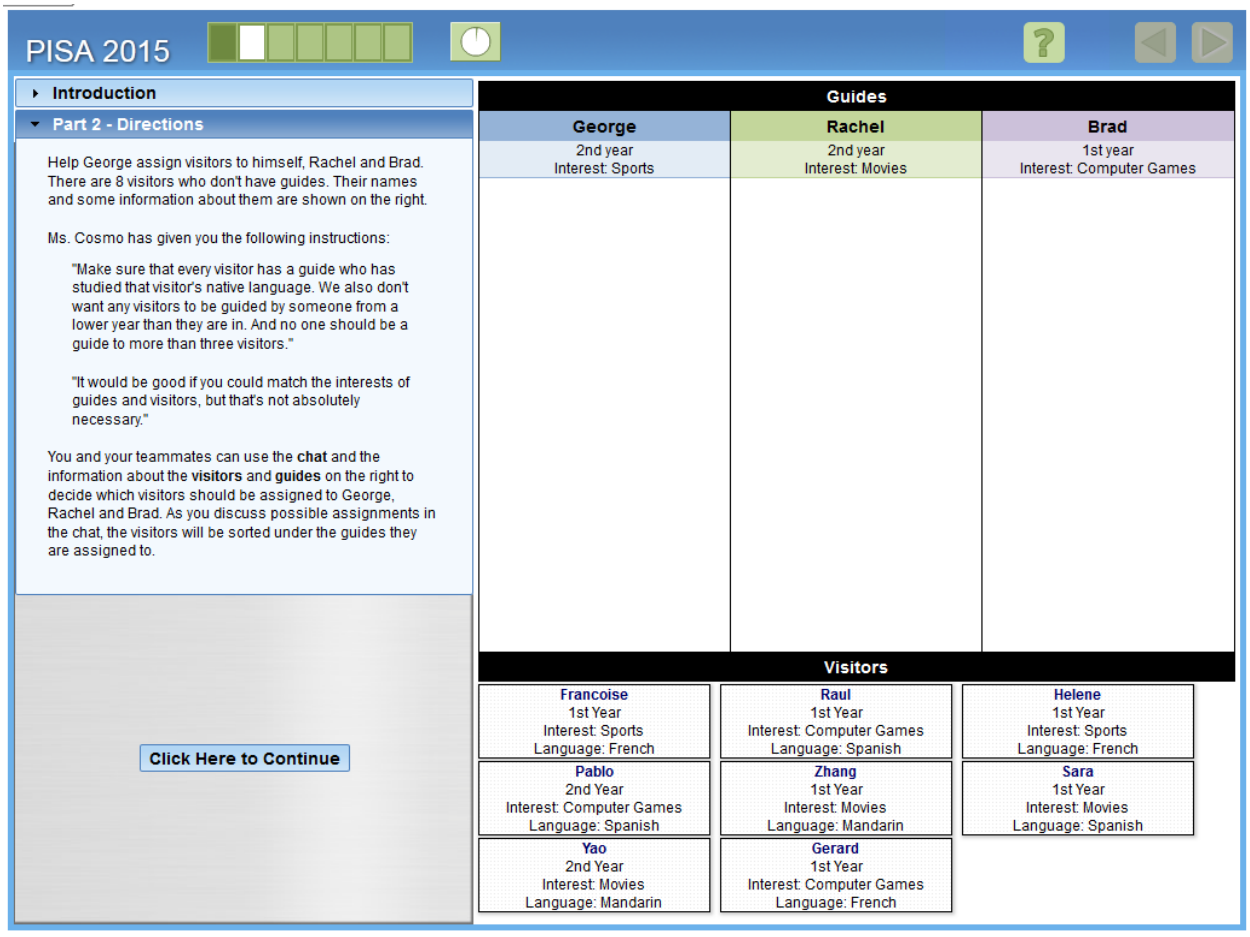
The directions for Part 2 summarise the key criteria that need to be considered when selecting the student-visitor groupings.

- Each team member can act as a guide to a maximum of three visitors
- Each visitor must be assigned to a guide who has studied the visitor's native language
- Guides must be of equal or higher class rank than the visitors assigned to them

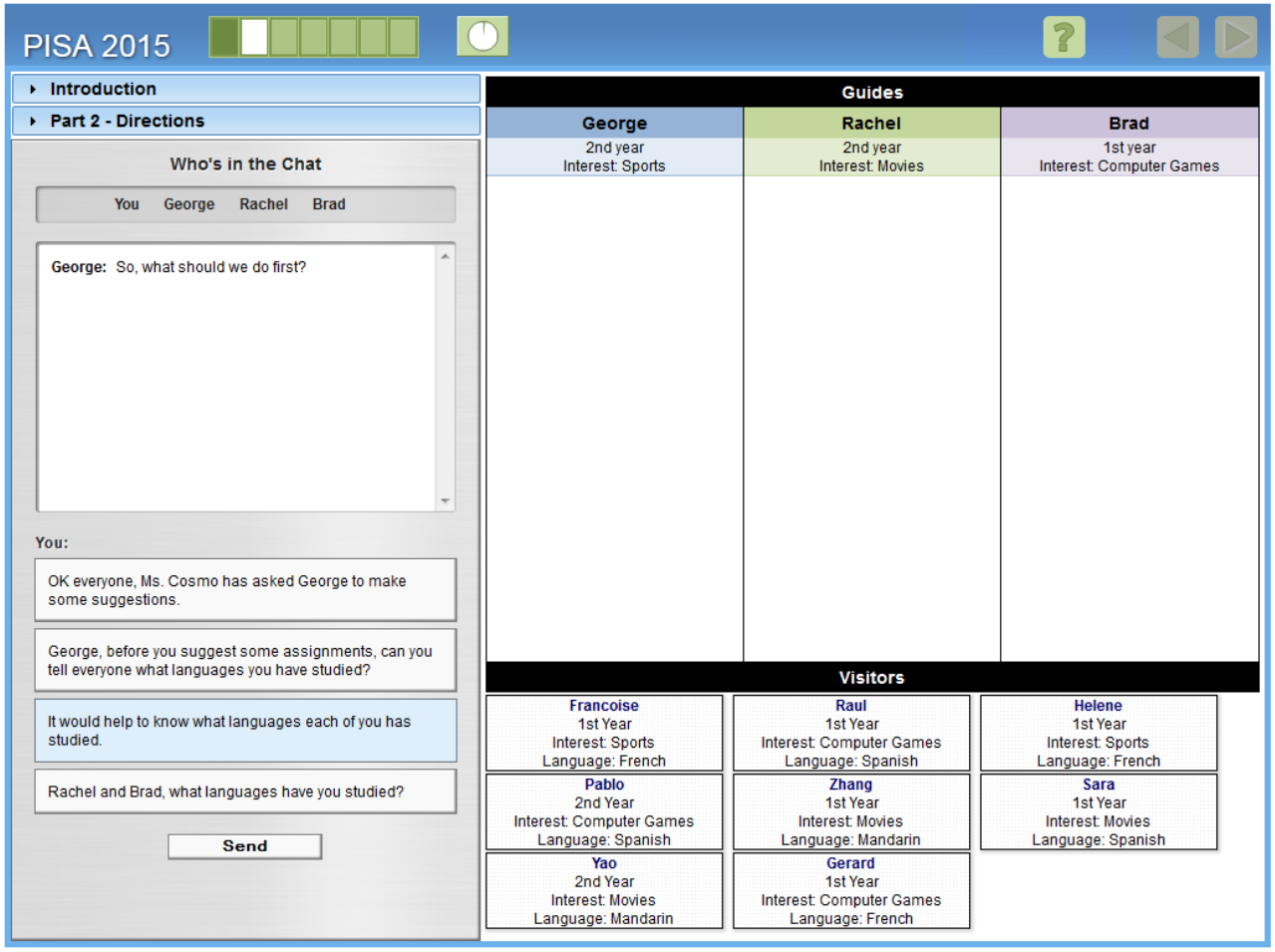
The advisor also mentions that it would be desirable to match visitors and guides with respect to outside interests and favorite subjects, but that this is not a requirement.

Note that the attributes for the guides and visitors are such that there are multiple assignment possibilities that will fulfill the three essential conditions.

On the right side of the screen, the table shown below displays. Over the course of the chat, as new information is added and assignments are proposed, the display reflects that conversation.



## Part 2 – Sample Screen #1



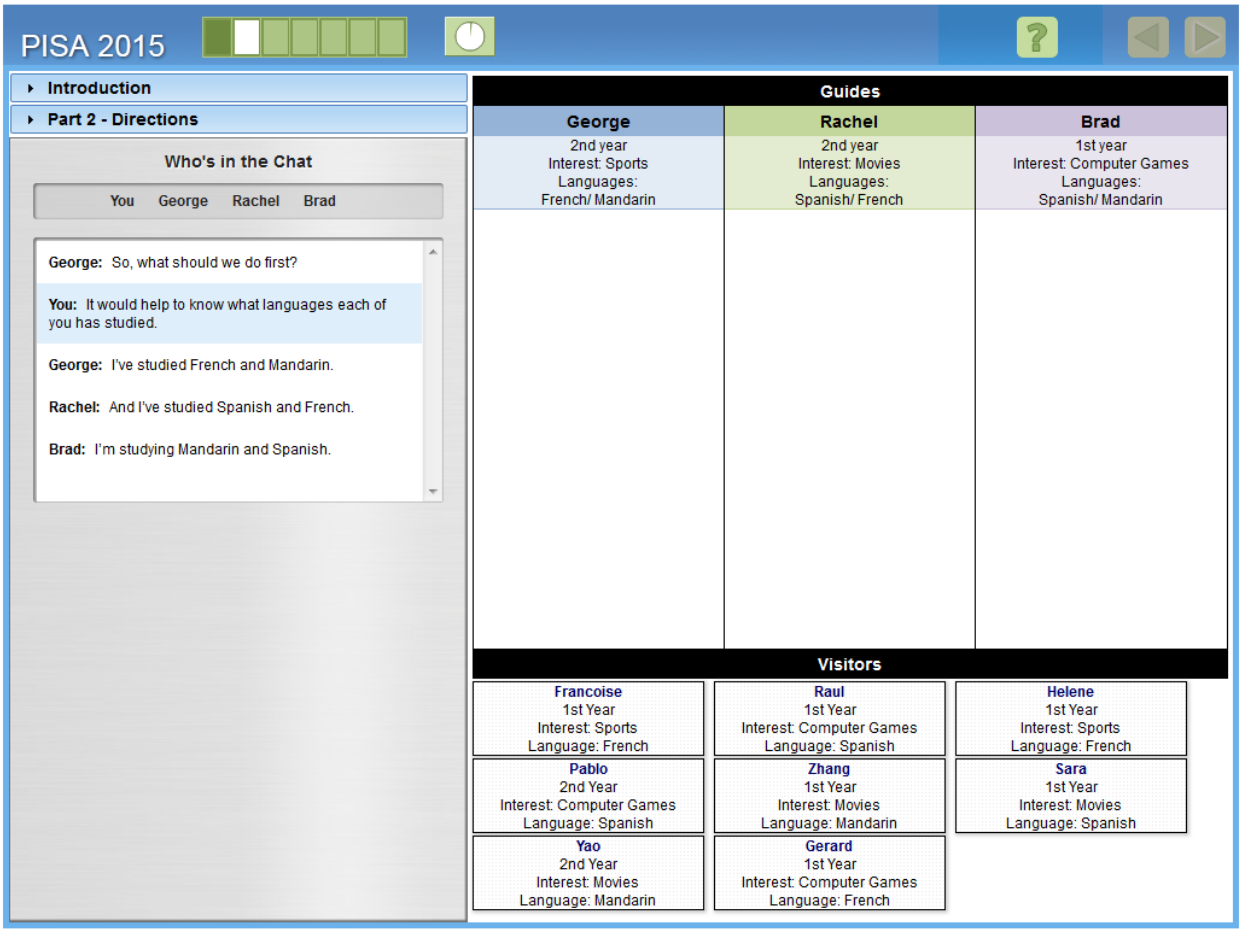

| | |
|---|---|
| *Item* | CC101201 |
| *Credited Response* | Full credit: It would help to know what languages each of you has studied.<br>Partial credit: George, before you suggest some assignments, can you tell everyone what languages you have studied?<br>Partial credit: Rachel and Brad, what languages have you studied? |
| *Classification* | (A1) Discovering perspectives and abilities of team members |

Credited responses focus on collecting information about team members' language experience, as guides need to have studied the language(s) of their assigned visitors. The full credit response focuses on all 3 team members; partial credit responses focus just on George or just on Rachel and Brad.

Item associated with alternate path:
While the first option does not move the problem solving forward, it does restate information provided by Ms. Cosmo. If the student selects the first option, George delivers a partial rescue by mentioning his own language abilities. The student then has a second opportunity to suggest that the team provide information about language skills (**item 202**) with chat options similar to those presented in item 201.

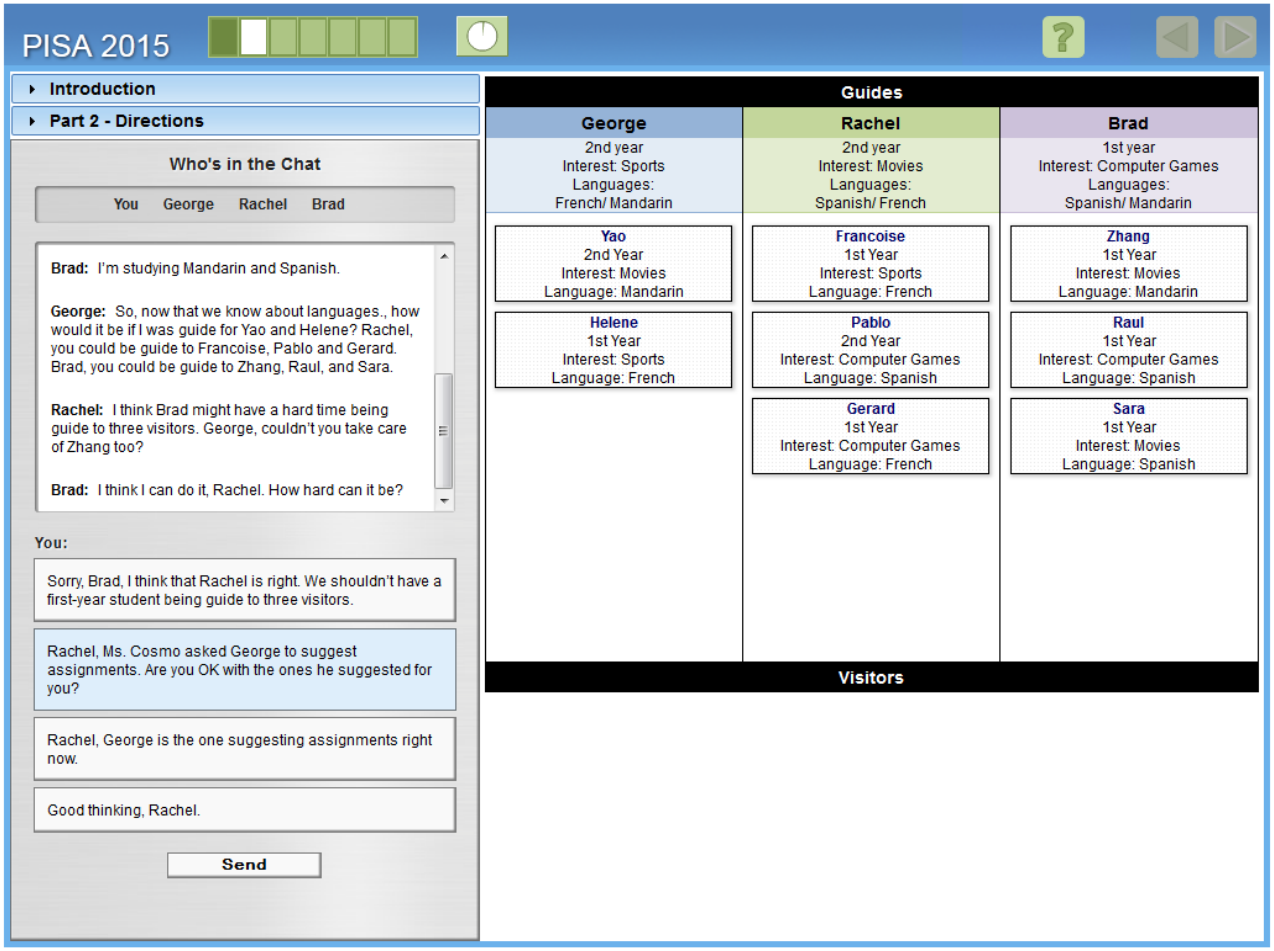
## Part 2 – Sample Screen #2

Each team member specifies the language(s) he or she has studied and these display under their names, along with their class year and interests.



## Part 2 – Sample Screen #3

George suggests visitor assignments and these display under each team member's name.
Rachel points out that Brad might have difficulty guiding 3 visitors.




| | |
|---|---|
| *Item* | CC101203 |
| *Credited Response* | Rachel, Ms. Cosmo asked George to suggest assignments. Are you OK with the ones he suggested for you? |
| *Classification* | (C3) Following rules of engagement |

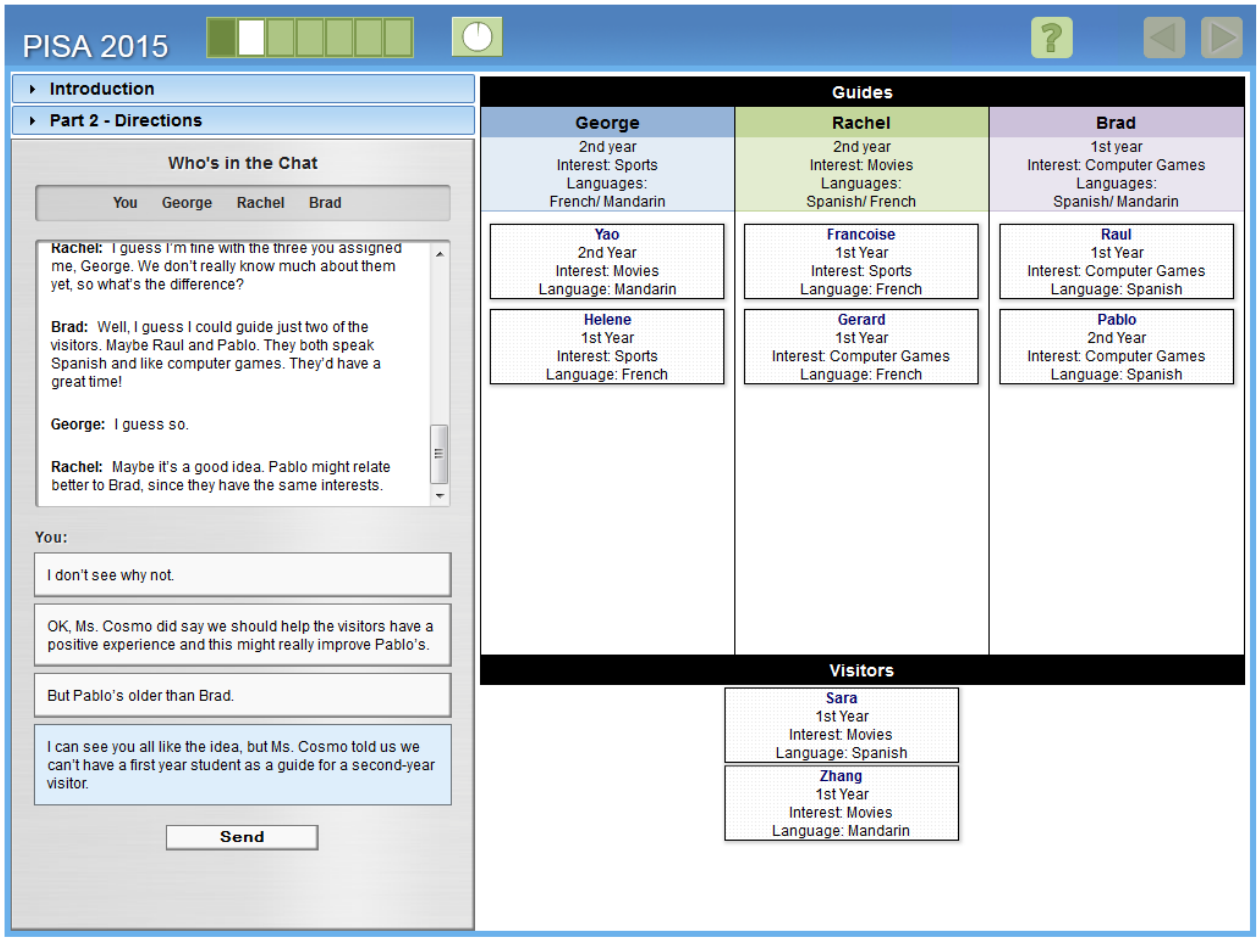
The credited response prompts the team to respect Ms. Cosmo's assignment of George as the leader for this task.

Items associated with alternate paths:
If the student selects the first option, George rescues by stating that, "That's not one of the rules Ms. Cosmo gave us.". The student then has a second chance to ask Rachel if she is ok with George's choices (**item 204**).

If the student selects the third option, Rachel rescues by acknowledging that George should make the assignments. The student then has a second chance to ask Rachel if she is ok with George's choices (**item 205**).

## Part 2 – Sample Screen #4

Rachel agrees to the visitors she was assigned and Brad agrees that he can act as a guide to two, rather than three, visitors but thinks that he would be a better match for Pablo and Raul based on languages and interests. The display of assignments changes accordingly.




| | |
|---|---|
| *Item* | CC101206 |
| *Credited Response* | I can see you all like the idea, but Ms. Cosmo told us we can't have a first year student as a guide for a second-year visitor. |
| *Classification* | (D1) Monitoring and repairing the shared understanding |

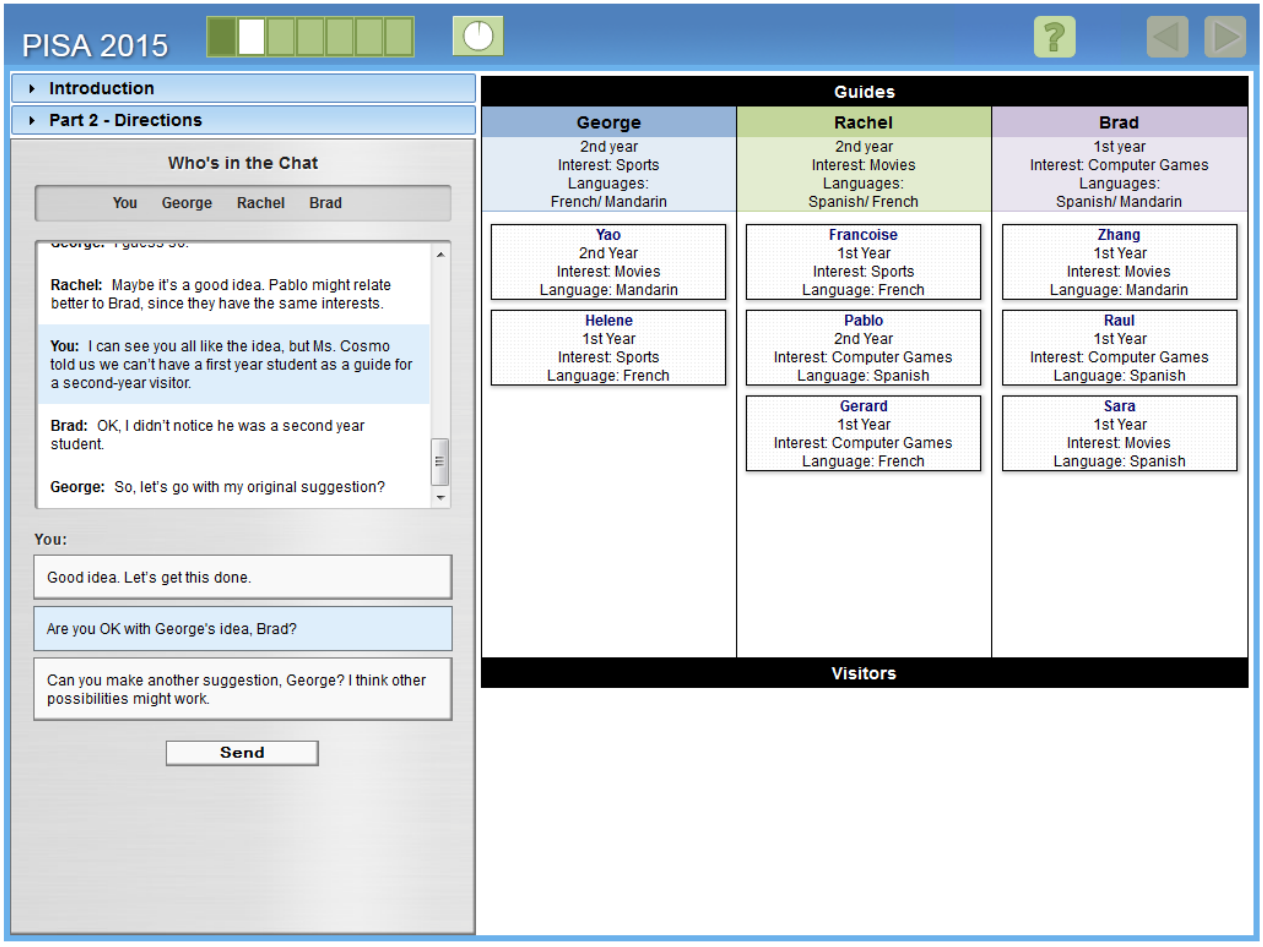
The credited response reminds the team about Ms. Cosmo's requirement that guides must be of equal or higher class rank than the visitors assigned to them, helping to ensure that the assignments meet the specified criteria.

If a student selects one of the first two responses, Rachel rescues, saying "Well, we forgot that Brad is a first year and Pablo is a second-year. It won't work."

Item associated with alternate path:
If student selects the third option, Brad asks why that matters and the student has a second chance to remind the team that a first year student cannot act as a guide for a second year visitor (**item 207**).

## Part 2 – Sample Screen #5

Brad says he didn't realise that Pablo was a second-year student and George suggests the team go with his original suggestion.

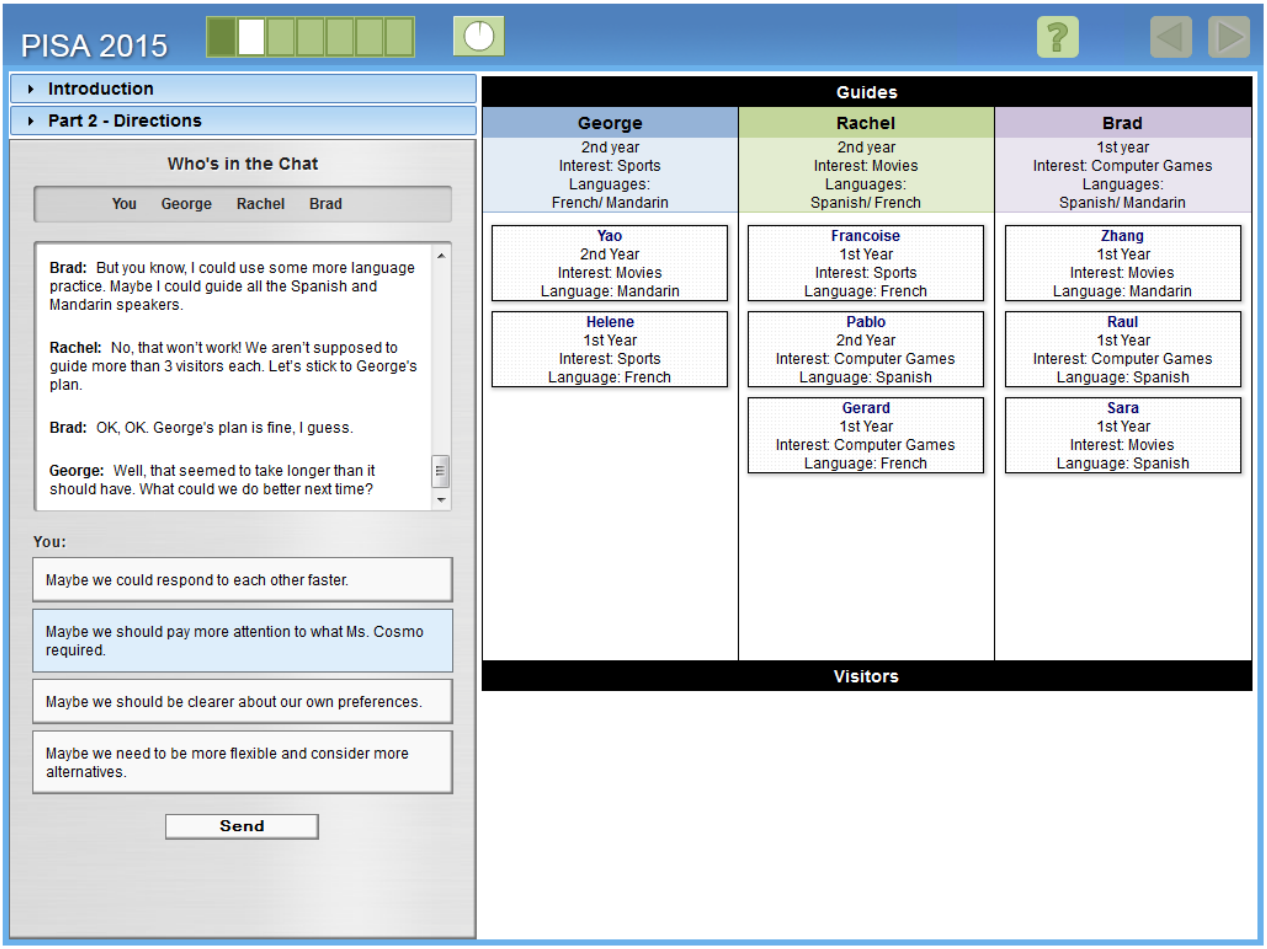



| | |
|---|---|
| *Item* | CC101208 |
| *Credited Response* | Are you OK with George's idea, Brad? |
| *Classification* | (D2) Monitoring results of actions and evaluating success in solving the problem |

The credited response prompts one team member to confirm another's suggestion.

## Part 2 – Sample Screen #6

The team members continue to discuss the selections, finally agreeing with George's plan. George notes that this task took longer than necessary and wonders how the team could do better next time.



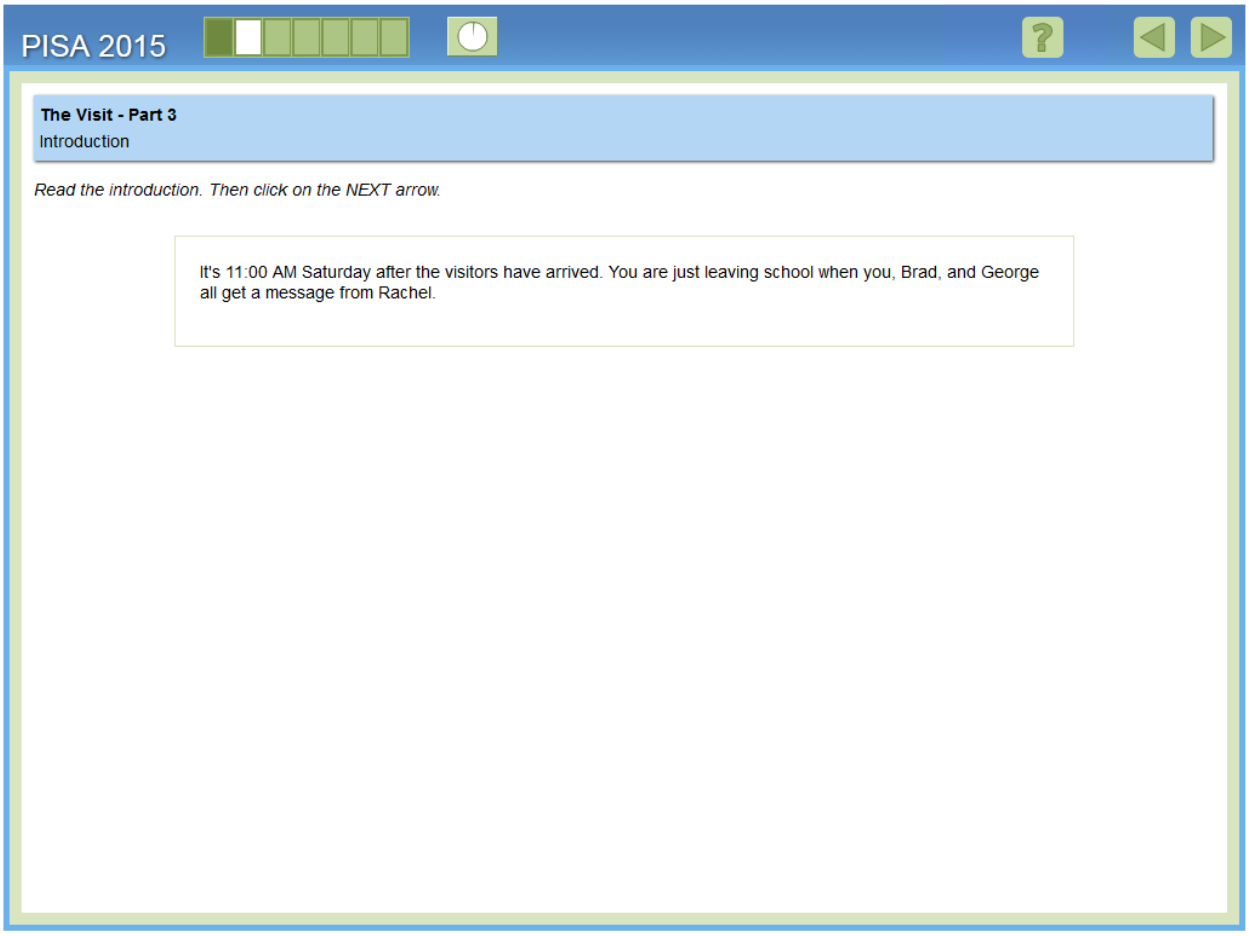

| | |
|---|---|
| *Item* | CC101209 |
| *Credited Response* | Maybe we should pay more attention to what Ms. Cosmo required. |
| *Classification* | (D3) Monitoring, providing feedback and adapting the team organisation and roles |

The credited response allows the student to reflect on the process and affirm the importance of attending to provided criteria in order to efficiently solve the problem.

If a student selects one of the other options, George concludes part 2, saying, "Well, at least we could agree. I'm looking forward to meeting them."

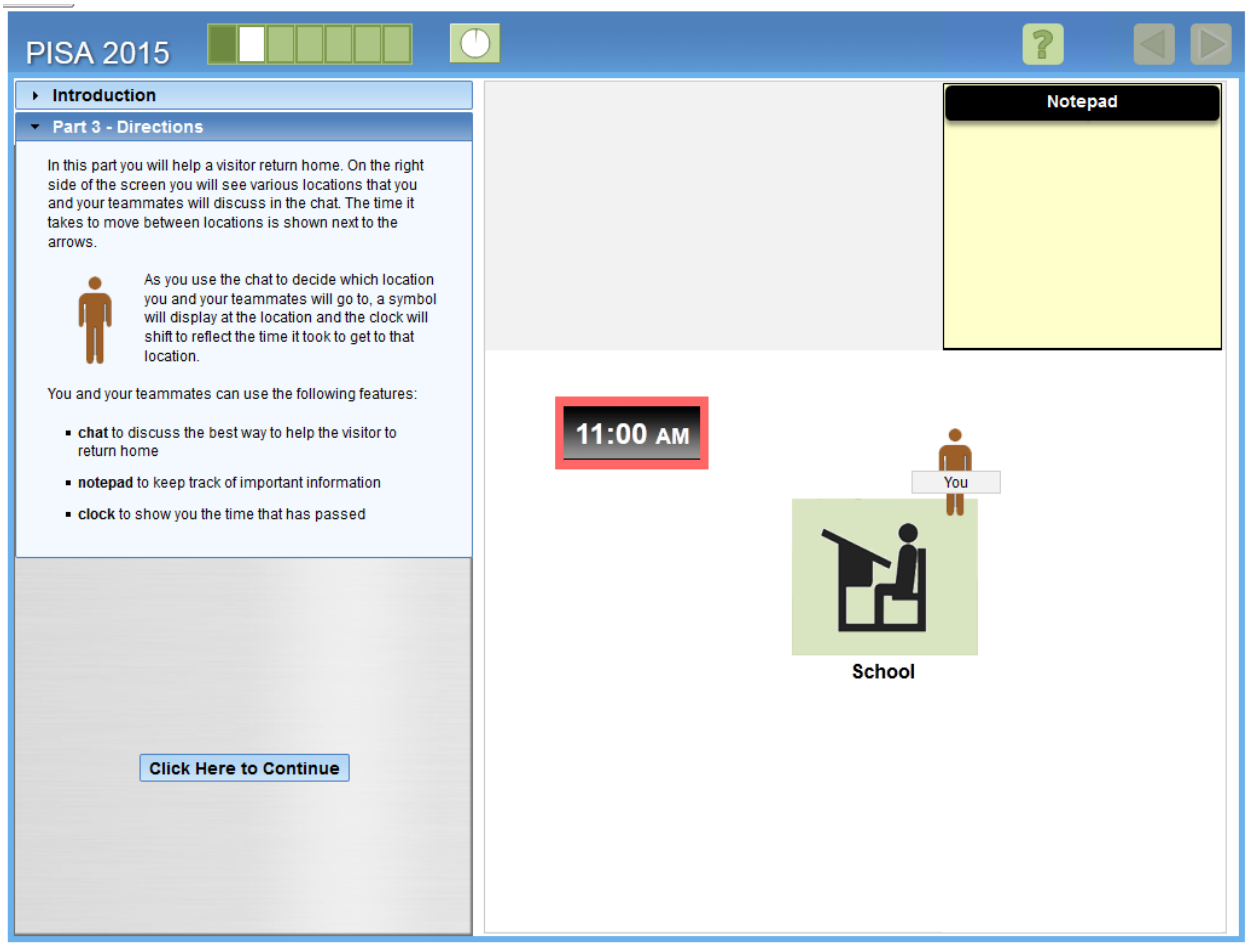
## Part 3: Overview

Part 3 focuses on the task of helping one of the visitors who needs to return home unexpectedly. The previously-made arrangements for taking the visitor to the airport have been upset and the student and agents must intervene. The team must first share information regarding the whereabouts of the visitor and attempt to rendezvous with him and, if possible, locate his lost mobile phone. After the rendezvous, the student and the agents must collaborate to determine the best way to get the visitor to the airport, subject to various constraints.



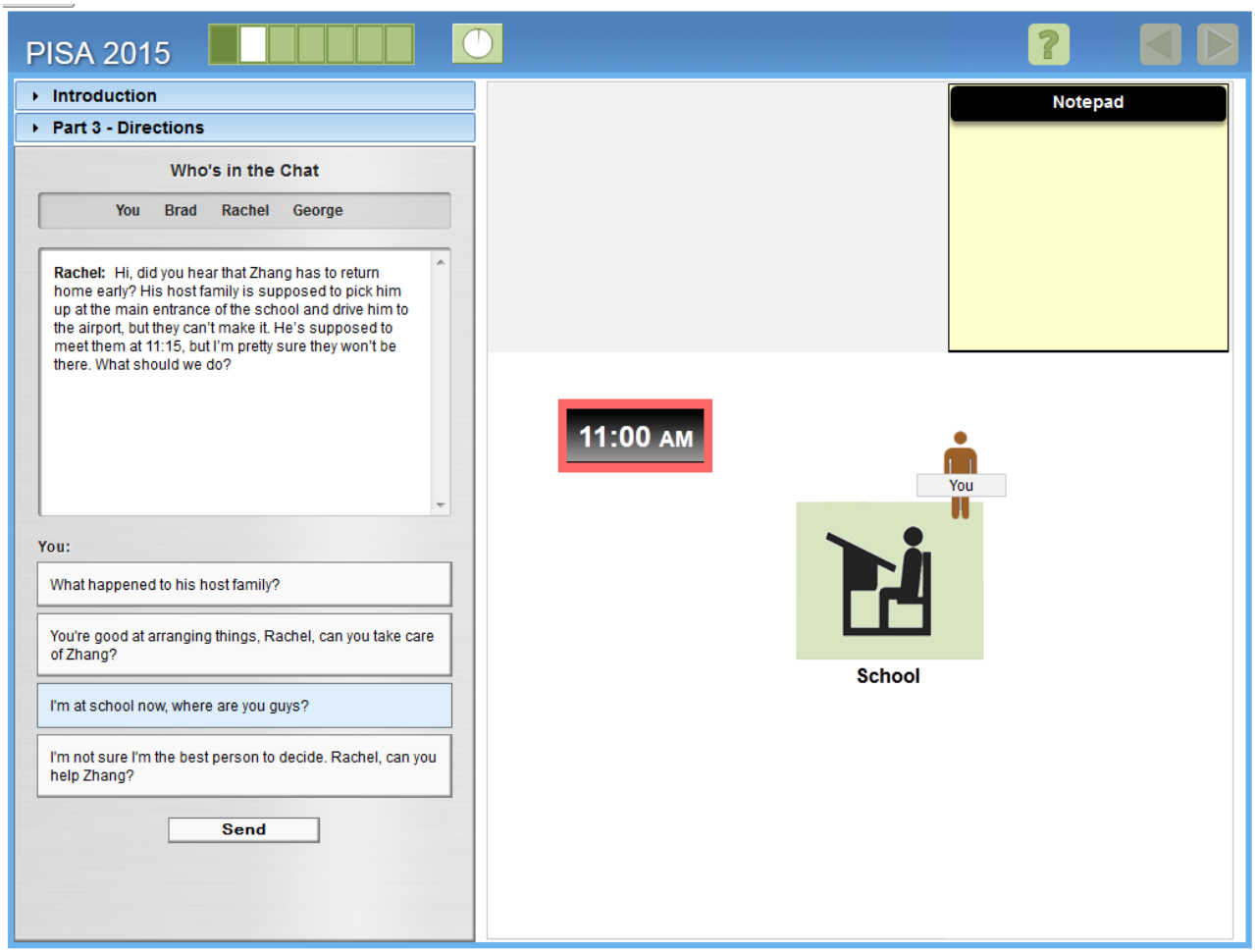
## Part 3: Directions

The directions specify the team's task: to help one of the visitors return home. The information that will display in the task area is also explained: locations of the team members will be shown, the clock will show the time, and notepad will display important information.



## Part 3 – Sample Screen #1

Rachel's message displays and sets out the basics of the problem to be solved by the team.




| | |
|---|---|
| *Item* | CC101301 |
| *Credited Response* | I'm at school now, where are you guys? (full credit) |
| *Classification* | (B3) Describing roles and team organisation (communication protocol/rules of engagement) |

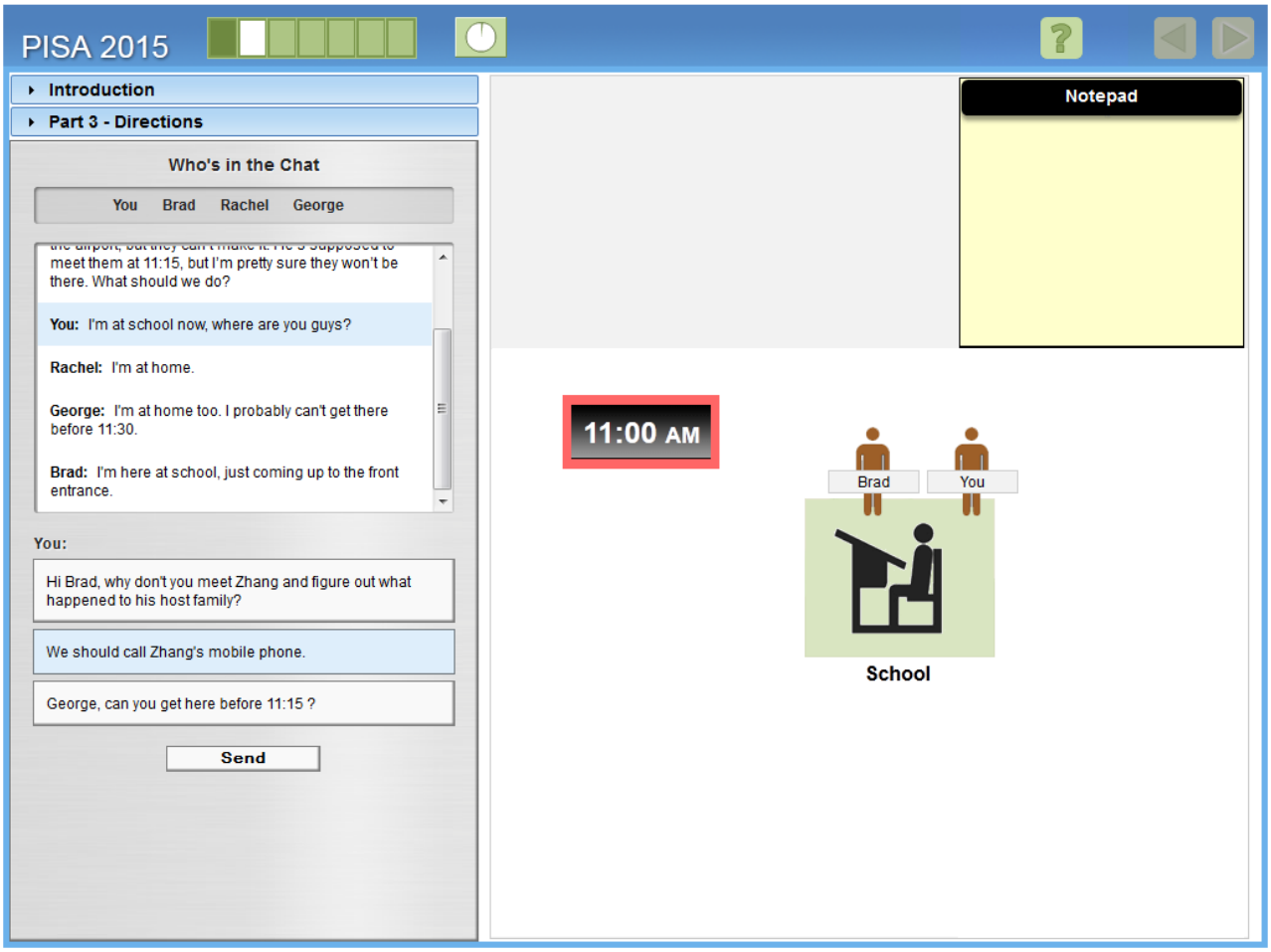
The credited response focuses the team on the first task, determining where everyone is.

Items associated with alternate paths:

- If the student selects the first option, Rachel rescues saying she doesn't know what happened to his host family and asking if you are at school. The student has a second chance to respond about his or her location: "I'm at school, where are you?" (**Item 302** – partial credit)
- If the student selects the second or fourth options, Rachel says she is at home. The student can respond by asking where everyone else is. (**Item 303** – partial credit)

## Part 3 – Sample Screen #2

Regardless of the path taken, Brad joins in, saying he is at the school and his icon displays in the task area.

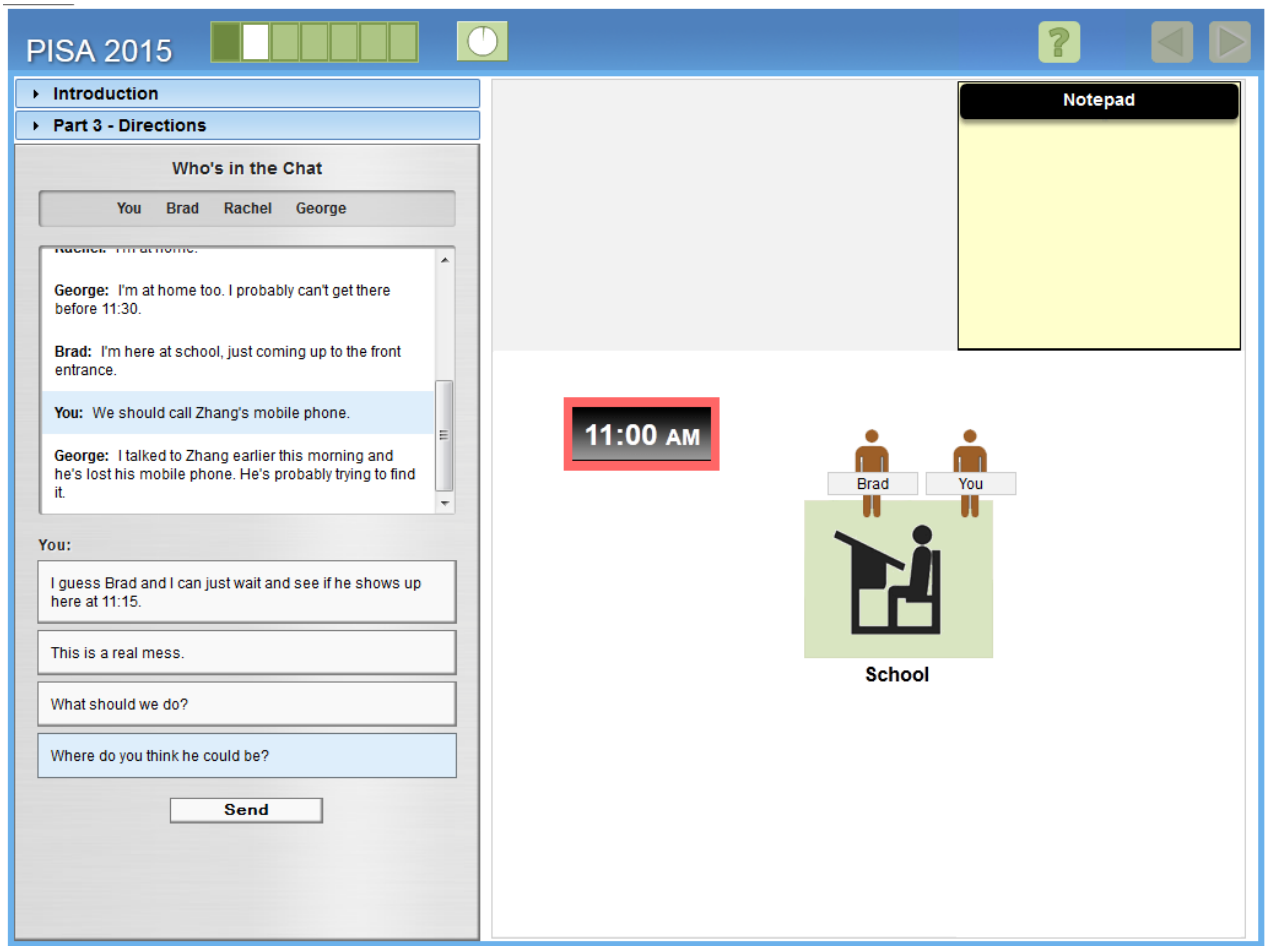



| | |
|---|---|
| *Item* | CC101304 |
| *Credited Response* | Full credit: We should call Zhang's mobile phone.<br>Partial credit: Hi Brad, why don't you meet Zhang and figure out what happened to his host family? |
| *Classification* | (A1) Discovering perspectives and abilities of team members |

Item associated with alternate path:
If the student selects the third option, George says he can't get to school until 11:30 and the student has a second chance to suggest they try to call Zhang on his cell phone (**item 305**).

## Part 3 – Sample Screen #3

George lets the team know that Zhang lost his cell phone and is trying to find it.

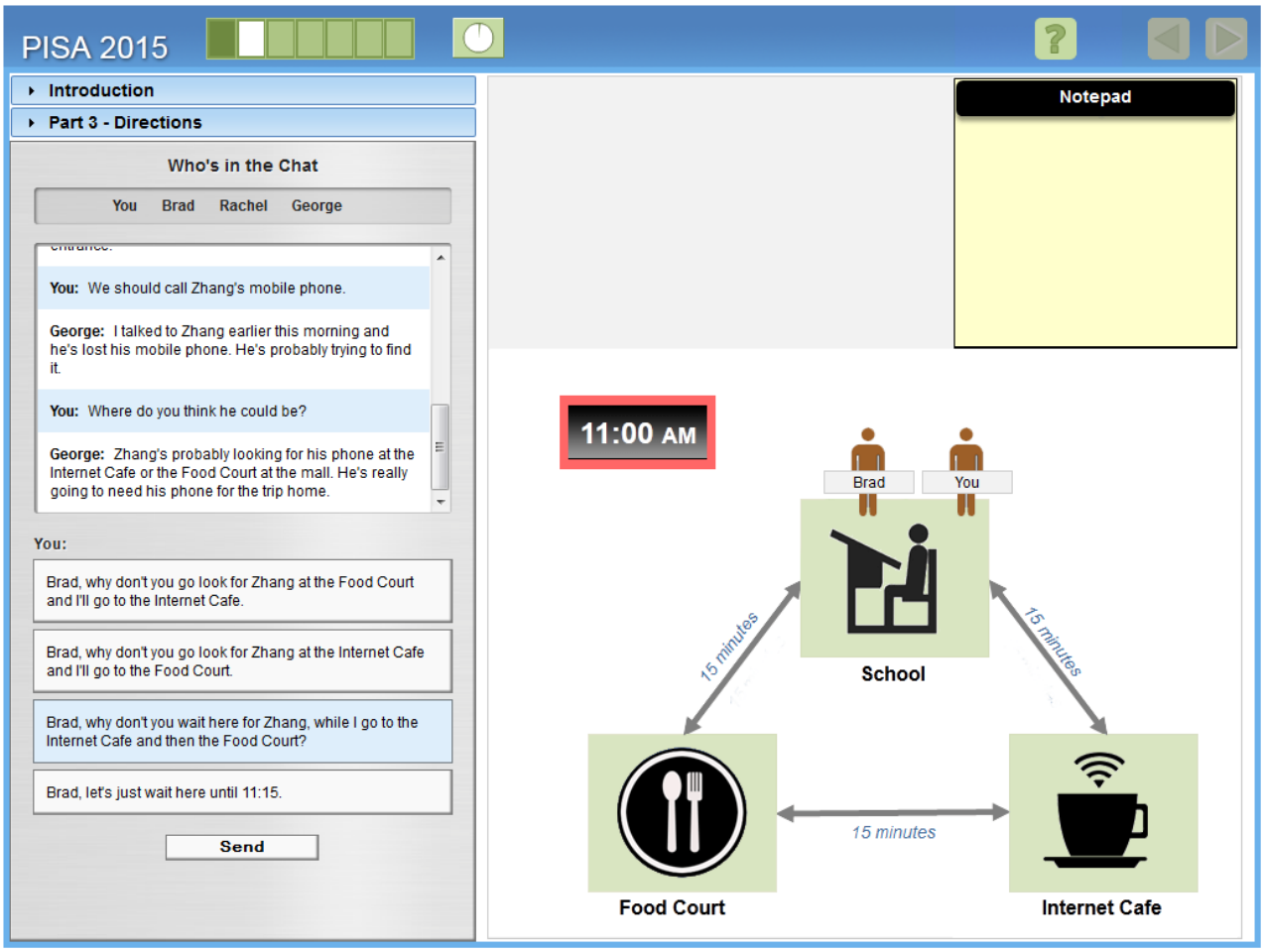



| | |
|---|---|
| *Item* | CC101306 |
| *Credited Response* | Two responses are equally credited:<br>What should we do?<br>Where do you think he could be? |
| *Classification* | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) |

Each of credited responses will elicit an idea from George about how the team should proceed.

## Part 3 – Sample Screen #4

George suggests that Zhang is trying to find his phone.

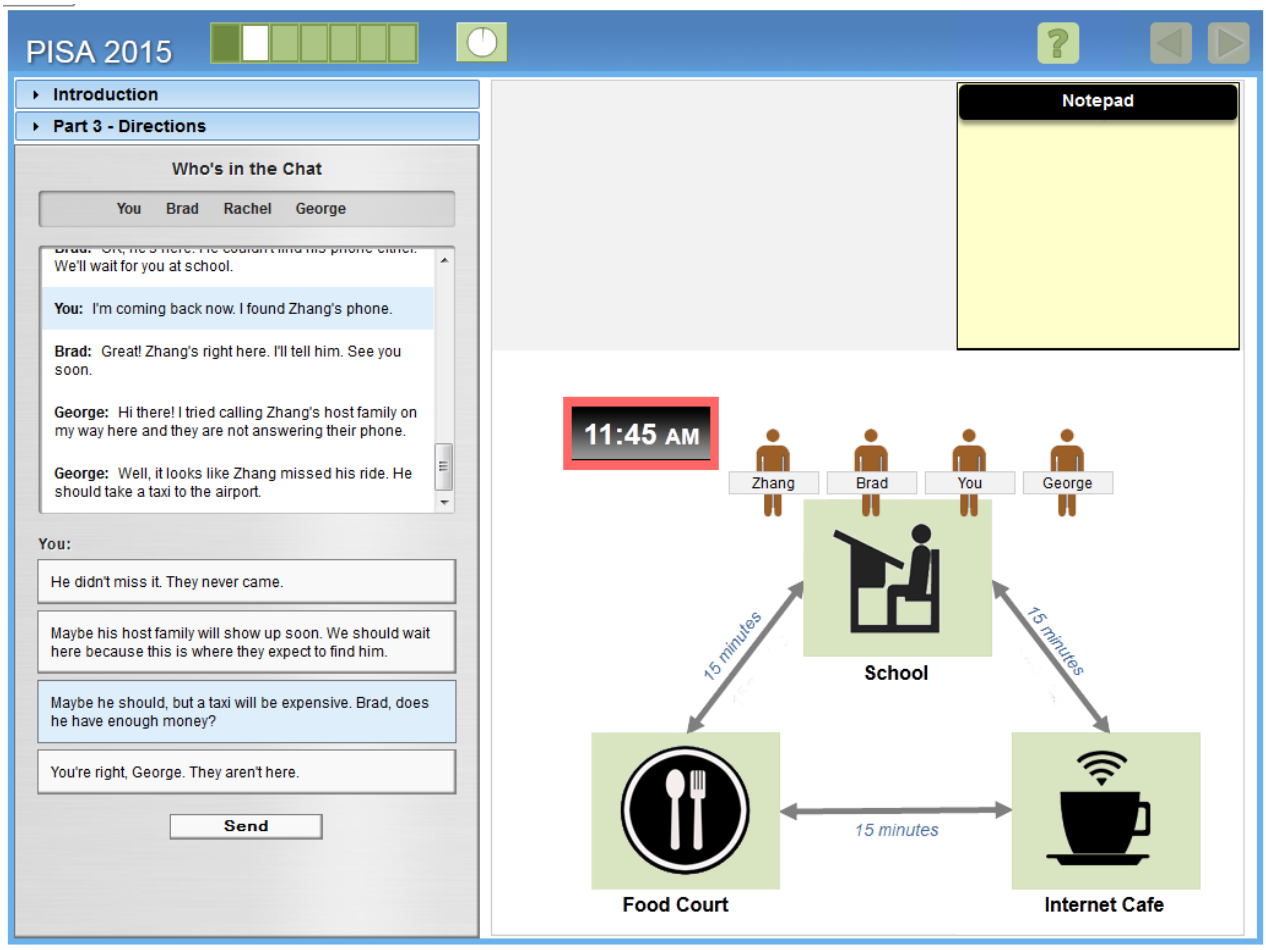



| | |
|---|---|
| *Item* | CC101307 |
| *Credited Response* | Full credit: Brad, why don't you wait here for Zhang, while I go to the Internet Cafe and then the Food Court?<br>Partial credit: Brad, let's just wait here until 11:15. |
| *Classification* | (C2) Enacting plans |

**Items 308 – 311** are associated with a series of alternate actions taken by the student, George and Brad as they decide who should go where to try and find Zhang and his phone.

## Part 3 – Sample Screen #5

Regardless of the path taken, Zhang ends up at the school and his phone is located. George brings up a new aspect of the problem – Zhang has missed his ride and needs to get to the airport.



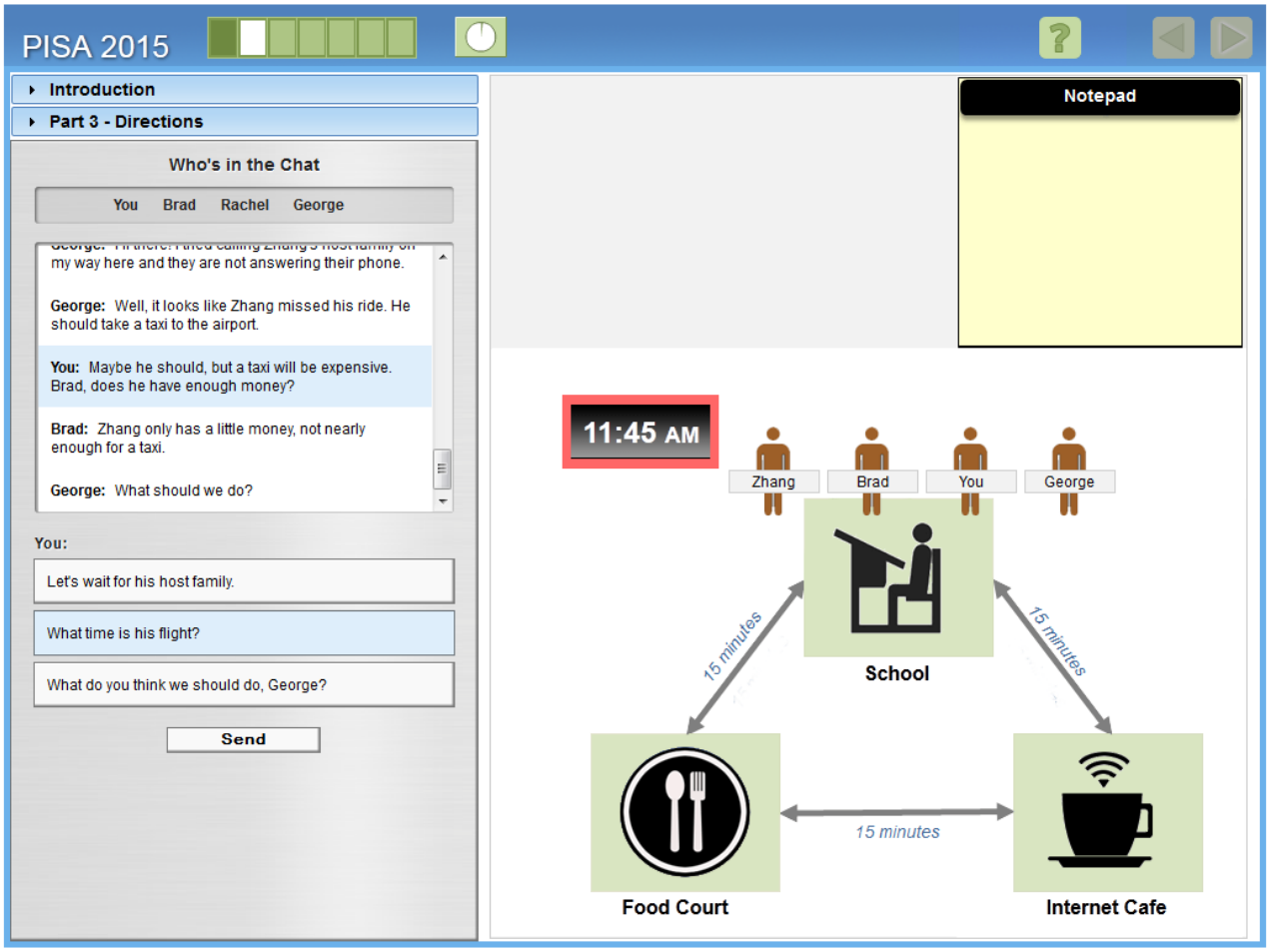

| | |
|---|---|
| *Item* | CC101312 |
| *Credited Response* | Maybe he should, but a taxi will be expensive. Brad, does he have enough money? |
| *Classification* | (C2) Enacting plans |

The credited response raises a question that the team must take into account when considering transportation options.

Item associated with alternate path:
If the student selects the first or second options, Brad reports that Rachel said the host family wasn't coming and George raises the point that a taxi could be expensive. If the student selects the last option, George mentions that a taxi could be expensive. The student has a second chance to ask if Zhang has enough money for a taxi (**item 313**).

## Part 3 – Sample Screen #6

Brad shares the information that Zhang does not have enough money for a taxi.




| | |
|---|---|
| *Item* | CC101314 |
| *Credited Response* | What time is his flight? |
| *Classification* | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) |

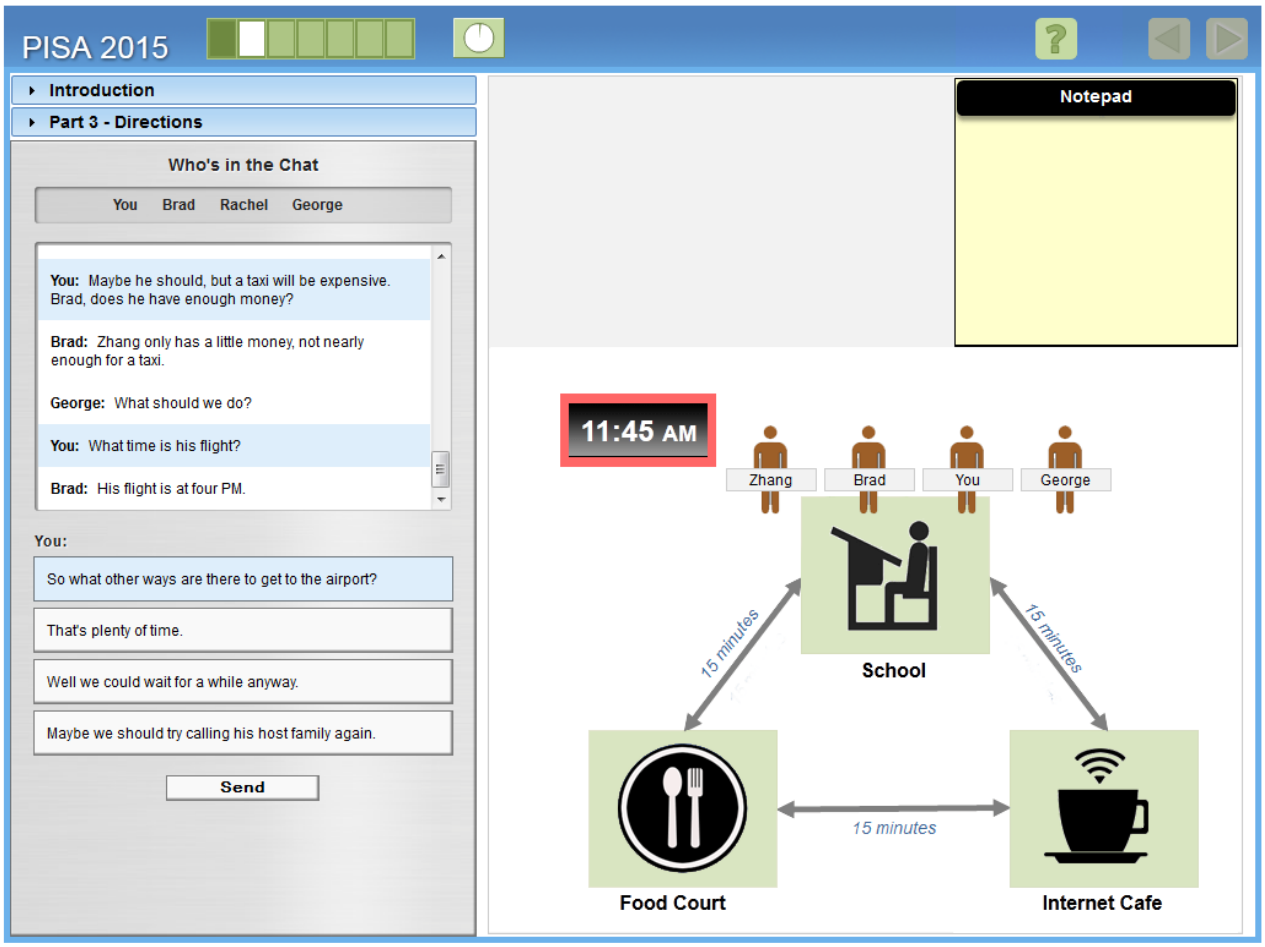
The credited response focuses the team on key information needed to solve the problem.

If the first option is selected, George rescues by asking how long the team should wait.

Selecting the third option lead s to Brad's comment, shown on the following page.

## Part 3 – Sample Screen #7

Brad provides information about when Zhang's flight is scheduled to leave.



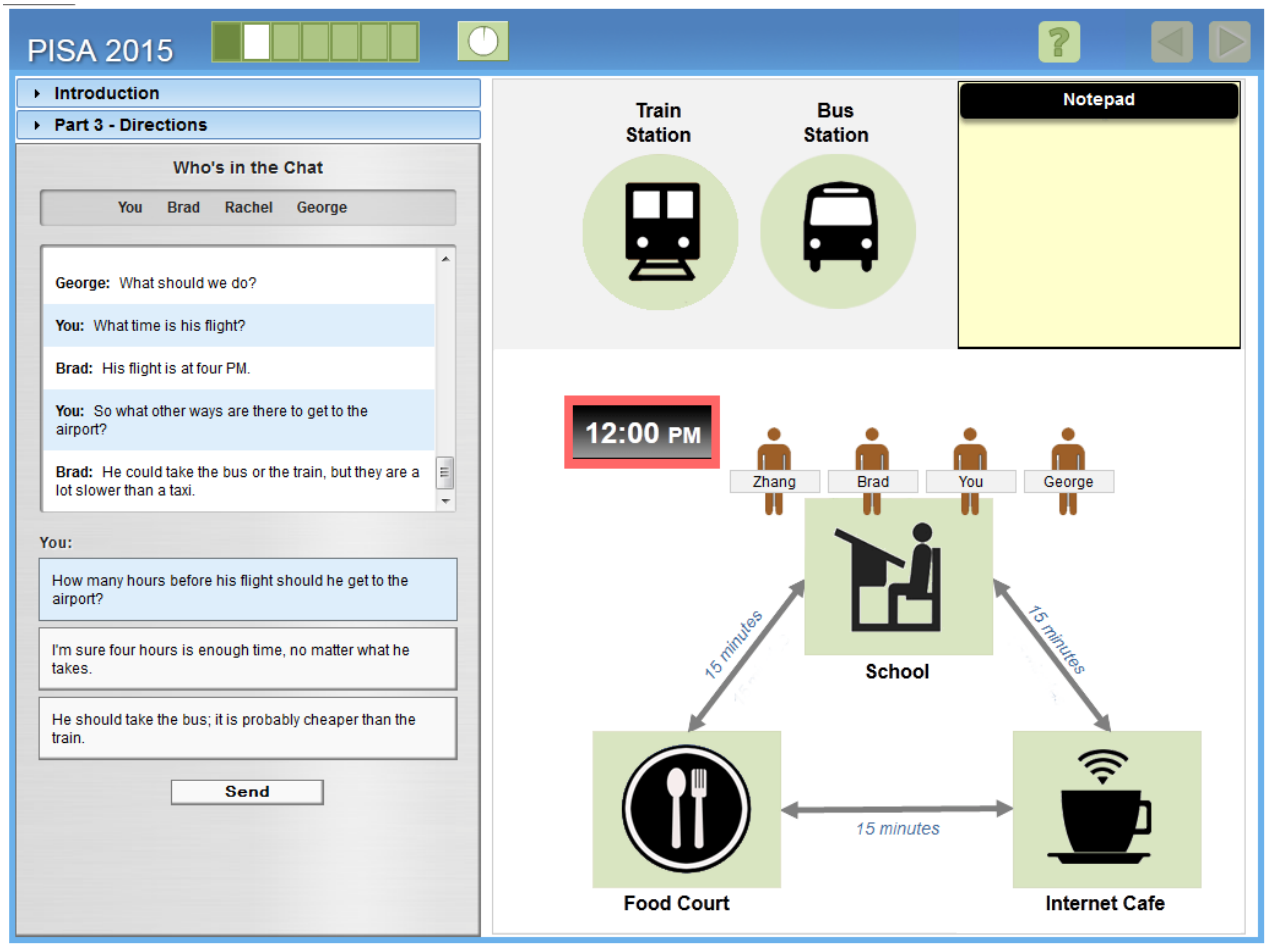

| | |
|---|---|
| *Item* | CC101315 |
| *Credited Response* | So what other ways are there to get to the airport? |
| *Classification* | (B1) Building a shared representation and negotiating the meaning of the problem (common ground) |

The credited response helps formulate the problem by asking the team to consider the range of transportation options.

If the student selects any of the other options, George rescues by saying, "We should think of other ways for Zhang to get to the airport."

## Part 3 – Sample Screen #8

Brad says that Zhang could take the bus or train, but they are slower. The clock updates to 12:00 and the train station and bus station icons display.

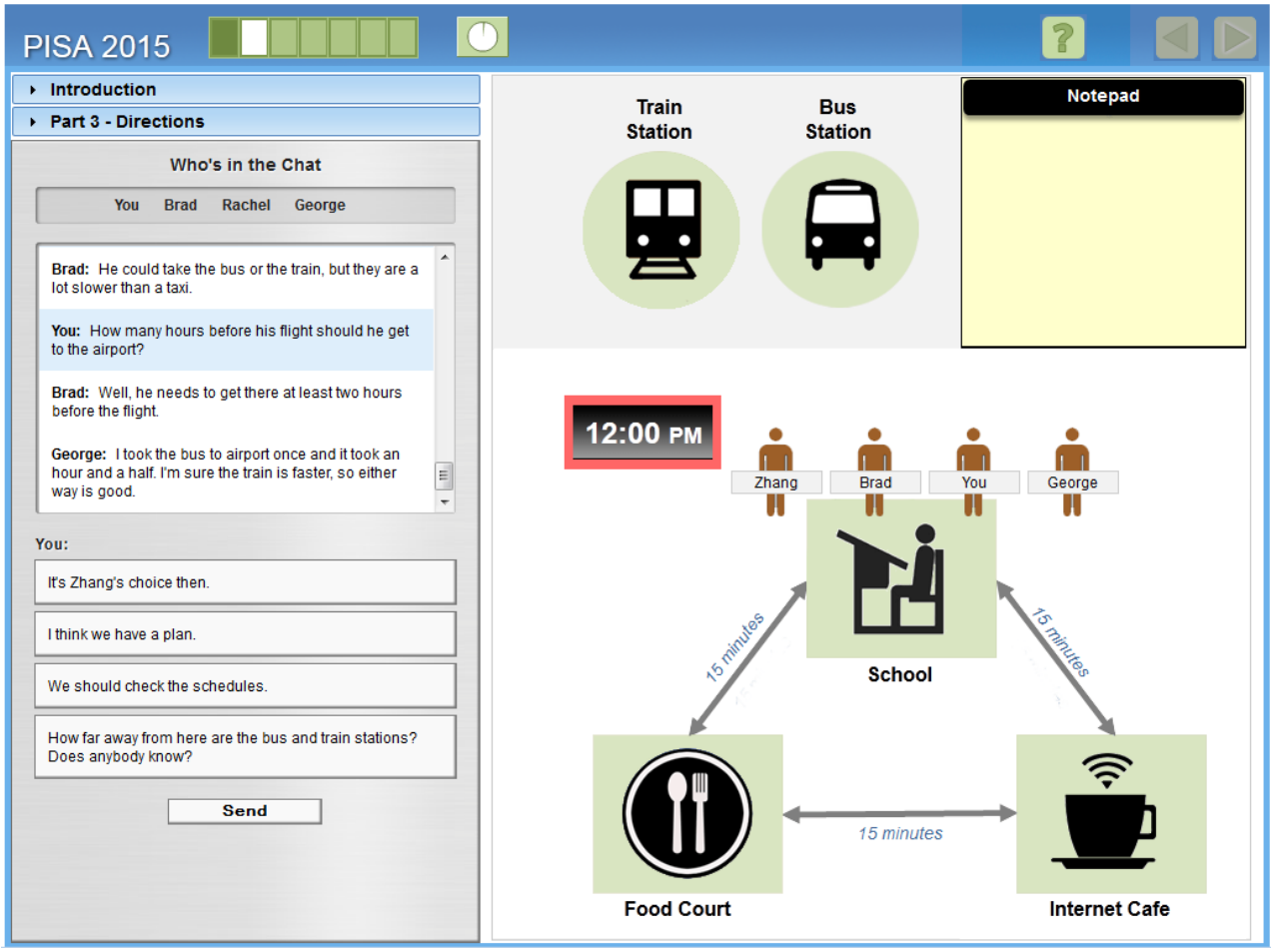



| | |
|---|---|
| *Item* | CC101316 |
| *Credited Response* | How many hours before his flight should he get to the airport? |
| *Classification* | (D1) Monitoring and repairing the shared understanding |

The credited response to this item advances the shared understanding of the group by seeking a clarification of the actual time constraints.

## Part 3 – Sample Screen #9

Brad says that Zhang needs to arrive at the airport at least two hours before his flight.



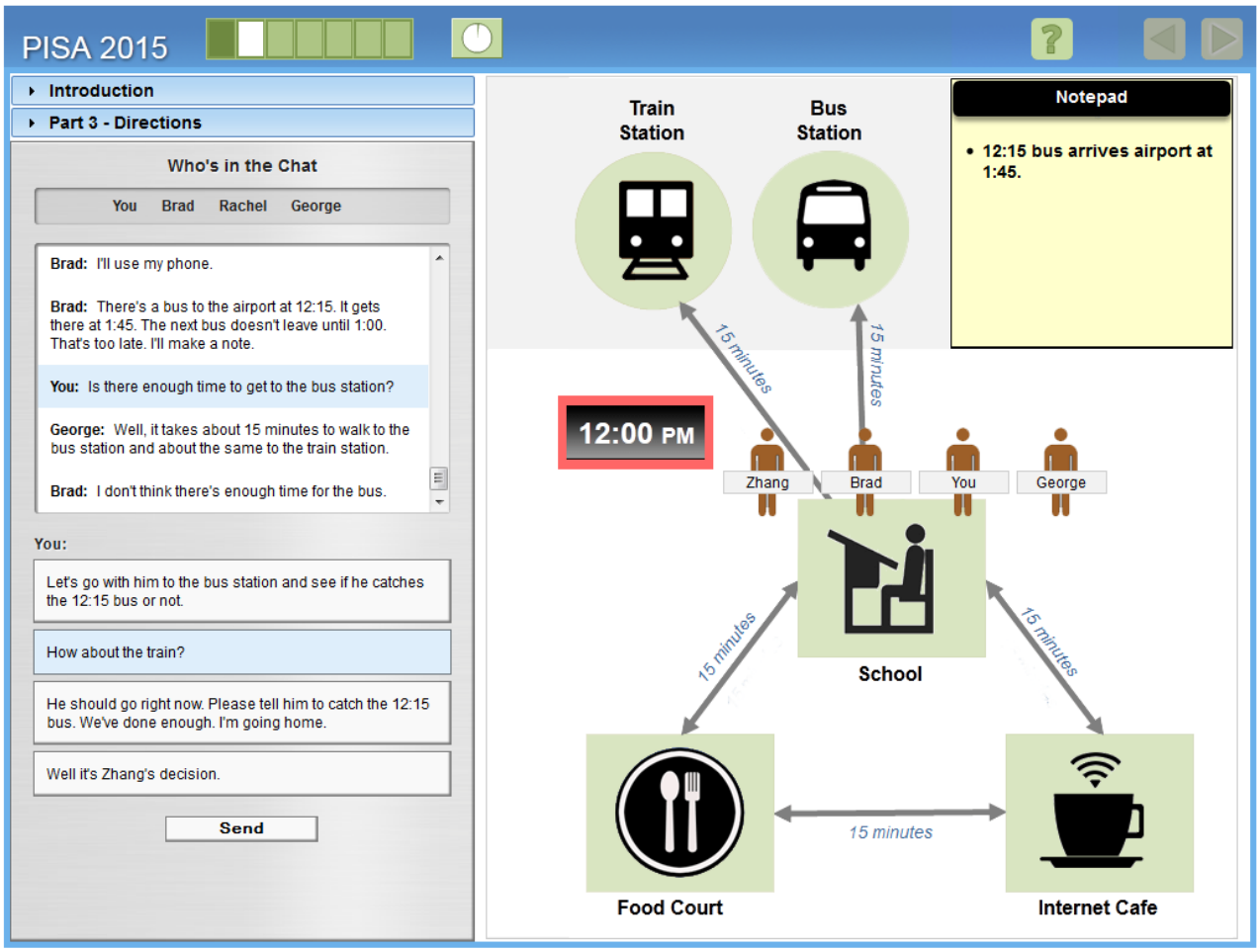

| | |
|---|---|
| *Item* | CC101317 |
| *Credited Response* | Two equally credited responses:<br>How far away from here are the bus and train stations? Does anybody know?<br>We should check the schedules. |
| *Classification* | (D1) Monitoring and repairing the shared understanding |

Items associated with alternate paths:

- If the student selects the first credited response (How far away. . . ), the student gets a second chance to suggest that the team check the schedules (**item 319**).
- If the student selects the second credited response (We should check the schedules) or the other two responses, Brad provides information about the bus schedule (one leaves at 12:15 and arrives at 1:45) and the student is able to ask if there is enough time to get to the bus station (**item 318**).

## Part 3 – Sample Screen #10

Regardless of the path taken, the information about the bus schedule is shared and recorded on the notepad. Brad identifies a potential problem: there may not be enough time to travel by bus.

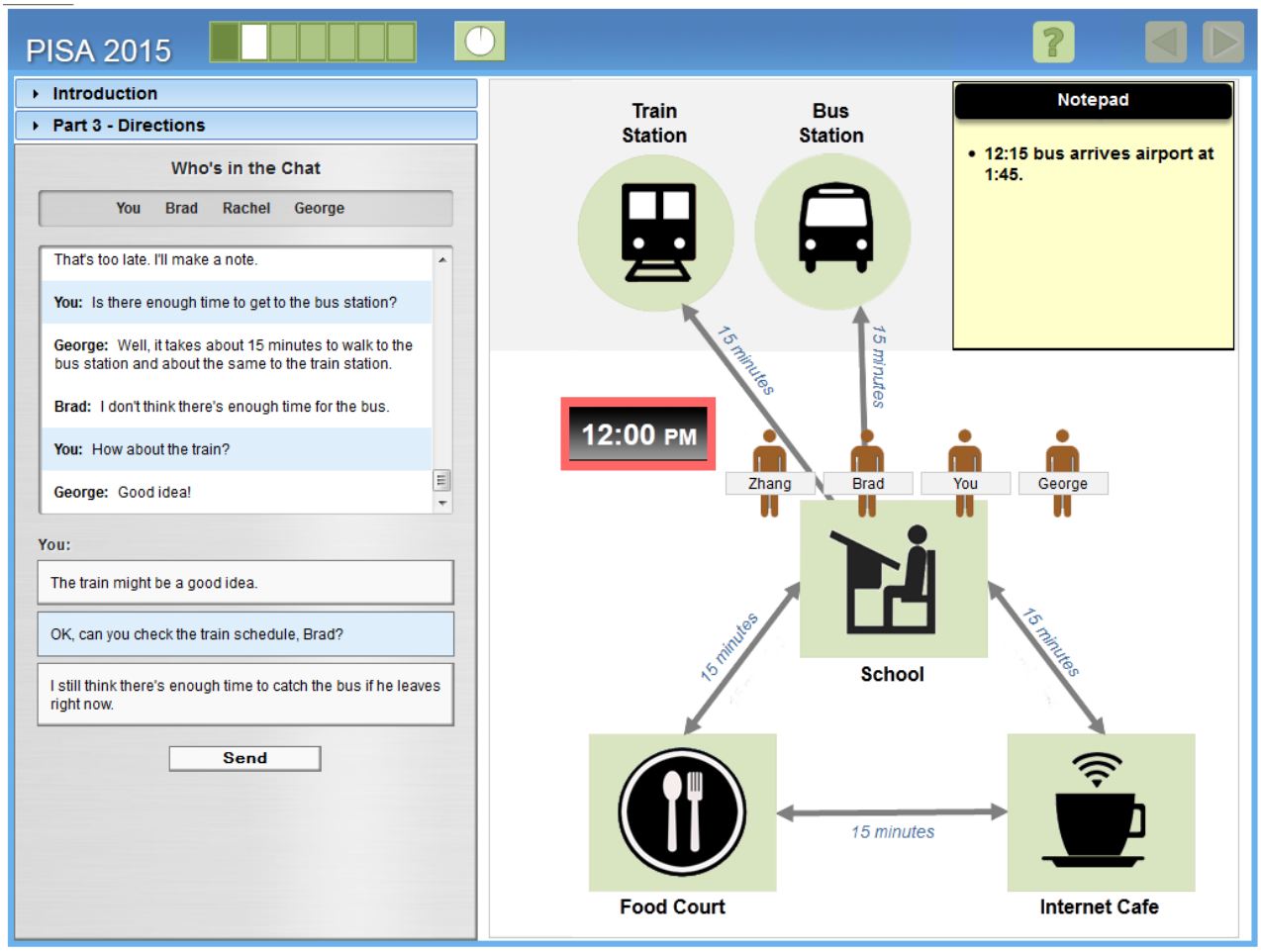



| | |
|---|---|
| *Item* | CC101320 |
| *Credited Response* | How about the train? |
| *Classification* | (C2) Enacting plans |

The credited response recognises that the last transportation option should be considered given the potential problem with the bus.

The incorrect responses lead to a rescue by Brad, who suggests that they consider the train.

## Part 3 – Sample Screen #11



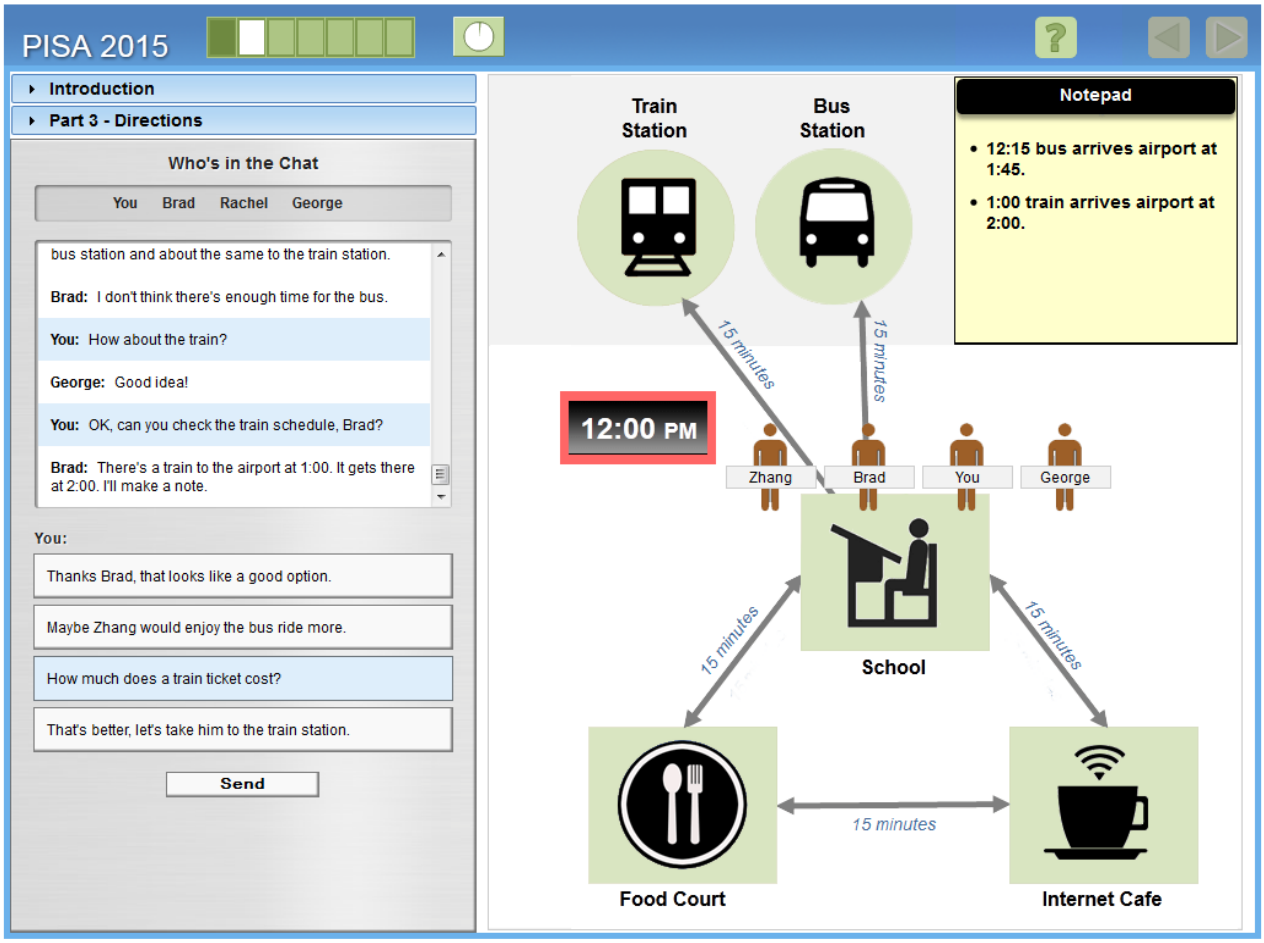

| | |
|---|---|
| *Item* | CC101321 |
| *Credited Response* | OK, can you check the train schedule, Brad? |
| *Classification* | (C2) Enacting plans |

The credited response moves the task forward by asking a team member to find information needed to make a decision about the train.

Selecting one of the incorrect options leads to a rescue by George, who asks Brad to check the train schedule.

## Part 3 – Sample Screen #12

Brad provides information about the train schedule and that information is recorded on the notepad.




| | |
|---|---|
| *Item* | CC101322 |
| *Credited Response* | How much does a train ticket cost? |
| *Classification* | (C2) Enacting plans |

The credited response is correct because it has been established that that team needs to consider both travel time and cost.

## Part 3 – Sample Screen #13

George rescues to resolve the cost issue saying he will lend Zhang the money if needed and Part 3 is concluded.